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16. Abstract

The Louisiana Offshore Oil Port (LOOP) environmental Monitoring Program (EMP) was initiated in 1978 to monitor the condition of the marsh ecosystem surrounding the LOOP pipeline. The goal of the EMP is to determine if the LOOP facility and pipeline adversely impact surrounding wetland plant and wildlife communities as a result of the construction (1978-1981) and operation (1982-current) of the LOOP pipeline. This year's EMP utilized one elevational ground survey, three ground-based vegetative surveys, and four wildlife aerial surveys to generate quantitative and qualitative data for the analysis of impacts.

In 2000-2001, C-K Associates conducted the elevational, vegetative, and wildlife surveys as mandated by the EMP. Vegetative biomass and species diversity within existing wetlands were used to estimate primary production within the project area. Low-altitude helicopter flights were used to count muskrats, wading bird/seabird rookeries, and wading bird and pelicans. The monitoring data was compared to control areas within the established corridor and to historical data to identify correlations using standard statistical methods.

The construction of the LOOP facility and pipeline resulted in a decrease in marsh surface area and corresponding primary production. The results of the vegetative biomass survey did not indicated that the operation of the LOOP facility and pipeline have recently or historically resulted in adverse impacts to the marsh. Results also indicate the beach-dune area overlaying the subsurface pipeline is stable in regard to elevation and vegetative cover, but exhibits natural shoreline erosion along the Gulf of Mexico. This is significant in regard to the overall stability of the dune itself since open waters border its landward side. Analysis of data generated during the wildlife surveys failed to show any correlation to the construction and operation of the LOOP pipeline, except that wading bird densities decreased during the construction and early recovery years of 1978 through 1984.

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LOOP Environmental Monitoring Program
2000 – 2001
Vegetation and Wildlife

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ABSTRACT

The Louisiana Offshore Oil Port (LOOP) Environmental Monitoring Program (EMP) was initiated in 1978 to monitor the condition of the marsh ecosystem surrounding the LOOP pipeline. The goal of the EMP is to determine if the LOOP facility and pipeline adversely impact surrounding wetland plant and wildlife communities as a result of the construction (1978 – 1981) and operation (1982 – current) of the LOOP pipeline. This year's EMP utilized one elevational ground survey, three ground-based vegetative surveys, and four wildlife aerial surveys to generate quantitative and qualitative data for the analysis of impacts.

In 2000-2001, C-K Associates conducted the elevational, vegetative, and wildlife surveys as mandated by the EMP. Vegetative biomass and species diversity within existing wetlands were used to estimate primary production within the project area. Low-altitude helicopter flights were used to count muskrats, wading bird/seabird rookeries, and wading bird and pelicans. The monitoring data was compared to control areas within the established corridor and to historical data to identify correlations using standard statistical methods.

The construction of the LOOP facility and pipeline resulted in a decrease in marsh surface area and corresponding primary production. The results of the vegetative biomass survey did not indicate that the operation of the LOOP facility and pipeline have recently or historically resulted in adverse impacts to the marsh. Results also indicate that the beach-dune area overlaying the subsurface pipeline is stable in regard to elevation and vegetative cover, but exhibits natural shoreline erosion along the Gulf of Mexico. This is significant in regard to the overall stability of the dune itself since open waters border its landward side. Analysis of data generated during the wildlife surveys failed to show any correlation to the construction and operation of the LOOP pipeline, except that wading bird densities decreased during the construction and early recovery years of 1978 through 1984.

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INTRODUCTION

The Louisiana Offshore Oil Port (LOOP) was completed in 1981 and is the only superport in the United States permitted and capable of off-loading and storing foreign crude oil from deep draft tankers. LOOP is a private corporation jointly owned by Shell Oil Company, Texaco Inc., Ashland Inc., Murphy Oil Corporation, and Marathon Pipeline Company. LOOP is regulated by the Louisiana Offshore Terminal Authority (LOTA), which was created by the Louisiana State Legislature in 1977.

The LOOP facility consists of an offshore port, an onshore booster station, and an onshore storage terminal (Figure 1). The offshore port is located in the Gulf of Mexico approximately eighteen miles (29 kilometers) south of Grand Isle, Louisiana, in 110 feet of water. The offshore port is comprised of three single-point mooring buoys anchored to the seabed and a marine terminal consisting of a pumping platform and control platform. Crude tankers are off-loaded at the offshore port. Mooring lines anchor the tanker to the buoy and flexible hoses are used to transport crude oil from the tanker to the marine terminal via a 56-inch diameter pipeline. The marine terminal pumps the crude oil via a 48-inch diameter pipeline to the Fourchon Booster Station and then to the Clovelly Dome Storage Terminal.

The Fourchon Booster Station contains four pumps which increase the pipeline pressure as the crude oil flows to the Clovelly Dome Storage Terminal. The Fourchon Booster Station also supplies diesel fuel via a four-inch diameter pipeline to the marine terminal. The Clovelly Dome Storage Terminal is used to store crude oil in underground salt caverns before it is shipped to various refineries. The terminal consists of eight caverns with a total capacity of 40 million barrels, a pump station, a meter station, and a 25 million-barrel Brine Storage Reservoir. The Brine Storage Reservoir is used to move crude oil in and out of the caverns. As the oil is pumped into the cavern, it displaces the brine into the reservoir. To remove oil from the cavern, brine is pumped into the cavern from the reservoir, thus pushing the lighter oil out.

The 99-mile (159-kilometer) LOOP pipeline has two segments: south of the Clovelly Dome Storage Terminal is referred to as the LOOP pipeline; north of the Clovelly Dome Storage Terminal is referred to as the LOCAP pipeline. The LOCAP pipeline terminates in St. James Parish on the Mississippi River where it connects to the CAPLINE pipeline, which distributes the crude oil to the Midwest.

The onshore pipeline, booster station, and storage facility were constructed almost entirely within Louisiana's coastal wetlands. As a consequence, LOTA required the development and implementation of a comprehensive Environmental Monitoring

Program (EMP). The purpose of the EMP is to determine if the LOOP facility adversely impacts surrounding wetland plant and wildlife communities as a result of construction and operation of the LOOP pipeline.

The LOOP pipeline segment from Port Fourchon to the Clovelly Storage Facility is contained within the western Barataria Bay estuary. This estuary is composed of a series of wetland habitats including bayous; swamps; fresh, intermediate, brackish, and saline marshes; inland bays; cheniers; and shoreline bordering the Gulf of Mexico. These wetland habitats are unique to coastal Louisiana and are among the most productive and diverse habitats in the United States.

During the past 20 years, an intensive scientific effort has focused on identifying coastal processes such as hydrodynamics and marsh nourishment in an effort to slow Louisiana's rapid rate of coastal land loss. This land loss is typified by marsh deterioration resulting in a loss of surface elevation and subsequent conversion to shallow, open saline water. The current rate of land loss in coastal Louisiana is estimated to be 32 square miles per year and 11.1 square miles per year within the Barataria Estuary. These are some of the highest rate of coastal land loss in the nation. The loss of these coastal wetlands represents a national concern as their inherent wetland functions and values are the basis of extensive economic, environmental, and social benefits for Louisiana and the nation.

The specific causes of coastal land loss result from both natural and anthropogenic activities including geologic subsidence, deltaic regression and transgression, rising sea level, storm surges, extensive leveeing of the Mississippi River, oil and gas exploration, failed agricultural activity, and other developmental pressures. All of these processes and activities ultimately affect surface hydrology (hydraulics) and sediment transport which are the processes that create and sustain all wetlands. Because coastal wetlands are generally extended flats with little topographic relief, constructed features such as containment levees, spoil banks, oil and gas access canals, ditches, and other relatively minor features can alter surface hydrology for extended distances. Such hydrologic alterations can accelerate land loss within a given area by increasing erosion associated with tidal flux and boat traffic, and advancing saltwater intrusion. Saltwater intrusion typically results in the conversion of fresh and intermediate wetlands habitat to more saline marsh. During this process, vegetative growth and organic accumulation are slowed and the soil surface becomes permanently inundated resulting in land loss.

When the LOOP EMP was established in 1978, very little was understood regarding coastal land loss. Thus, the data generated by the EMP during the past 20 years, including this year's monitoring data, are a unique and valuable record of habitat and wildlife data within a section of a larger ecosystem that has been in a documented state of

decline since 1954. However, because the factors influencing the rate of land loss are complex and closely interrelated, it is difficult to identify and attribute any adverse wetland impact to a specific activity regardless of its origin.

This report contains the results of the requisite LOOP EMP 2000-2001 (vegetation and wildlife) and an analysis as to the potential impacts of the construction and operation of the LOOP pipeline on the vegetative and wildlife communities within the LOOP pipeline corridor. Also, included are the results of specific hypothesis testing regarding relationships between current and historical survey data. And finally, this report concludes with a recommendation to redesign the future LOOP EMP to incorporate current information regarding coastal land loss and the use of advanced technologies to improve the accuracy of data collection and subsequent analysis in order to fulfill the overall goals and objectives of this program.

OBJECTIVES

The general requirements and objectives of the LOOP EMP are as follows:

1) to obtain seasonal environmental and ecological data so that conditions existing during operations can be related to historical baseline conditions;
2) to detect during the operation of the deepwater port any adverse alterations or damages to the environment so that corrective action can be taken as soon as possible;
3) to obtain sufficient data to determine the cause or causes of environmental damages or alterations so that responsibility can be properly placed; and
4) to provide information in order to evaluate long- and short-term impacts of the deepwater port.

To meet the objectives of the LOOP EMP, two primary indices were used to determine environmental change. First, species composition and density were used to signify changes in the physical and chemical environment. Second, net primary production was used to determine the quantity of production of the ecosystem. Principles of sampling design, data collection, and analysis were used to determine which variables were the most important causal agents. Surveys were conducted with respect to spatial and temporal variability as related to identifiable changes caused by the LOOP pipeline. Statistical methods were used to evaluate main effects, interactional effects between and among variables, and one-way effects between variables; test hypotheses; and determine spatial and temporal trends.

C-K Associates created and populated a Microsoft® ACCESS database to store historical data and to use for these analyses.

BEACH ELEVATION

Introduction

The LOOP pipeline crosses the beach at Port Fourchon, Louisiana. The pipeline was constructed at a minimum of 10 feet below surface. The overlaying beach habitat at this pipeline crossing is an important land mass that protects and buffers the marsh to the north from storm surge, high energy wave action, and tidal flux. Beach-dune complexes are involved in a cycle of formation and destruction as they respond to changes in wave energy, water level, and sediment supply (Davidson-Arnott 1988) *[1]*. Higher wave energies and water levels associated with storm events result in erosion of the beach, causing beach flattening and the transport of sediment offshore to form surf zone sand bars that help protect the beach and dune from the direct impact of storms by absorbing storm wave energy (Thom and Hall 1991) *[2]*. During calmer periods, the offshore sediment is returned to the beach through onshore migration of the surf zone sand bars (Stewart and Davidson-Arnott 1988) *[3]*.

As such, the LOOP pipeline crossing is vulnerable to shoreline erosion and overwash during storm events and by natural coastal processes that result in elevational land loss. The project area for this survey is the beach-dune complex from the Gulf of Mexico to Bayou Moreau (Figure 2), and extending 100 meters wide of each side of the LOOP pipeline.

Methodology

The beach elevation survey was designed to collect and evaluate data to determine if existing elevation conditions can be related to historical baseline data, specifically to determine if any impacts have occurred. The potential impacts were quantified by measuring beach elevation and topography. A grid pattern was created on the beach in the area between the beach and Bayou Moreau. The centerline of the pipeline was defined as the principal axis of the grid. The westernmost post of the LOOP sign along Bayou Moreau served as a temporary benchmark. The grid design consisted of four parallel transects at 25-meter intervals on both sides of the pipeline for a total of nine transects. Six transects were established 25 meters apart and perpendicular to the center line along the pipeline route (Figure 2).

At each point on the grid, "X-Y-Z" (latitude-longitude-elevation) data were collected using a Total Station. The grid data was then georeferenced to actual locations using Global Positioning System (GPS). The GPS files were downloaded into a software

program which was used to develop a Geographic Information System (GIS) for spatial and spectral analysis and displays relevant to the LOOP EMP.

Beach elevation data prior to 1997 were translated from feet to centimeters and then referenced to the 1988 National Geodetic Vertical Datum (NGVD) standard so that the data from November 1985 through January 2001 could be compared. Transects that contained a continuous data set for the complete twenty sampling periods were selected for statistical analyses using PC SAS Version 8.

The purpose of the statistical comparison was to determine whether the area on the east side or on the west side of the pipeline was more stable over the time period of consideration. For this, each grid point was compared against the comparable pipeline point (*e.g.*, E1 at 75 meters vs. pipeline at 75 meters).

The purpose of the transect-to-transect comparison was to determine if stability increased with distance from the pipeline. For this, each grid point on the east side was compared against the comparable grid point on the west side (*e.g.*, E1 at 100 meters vs. W1 at 100 meters).

Shapiro-Wilk statistics were used to assess if the data associated with each transect and distance exhibit normally statistical distribution. If not, another test was conducted to determine if the data were symmetrical. For those data which were normally distributed, the parametric paired t-test was selected to determine whether a significant difference existed in the data comparisons. For the data which were symmetrical but not normally distributed, the Wilcoxon matched pairs-signed ranks statistical inference test was conducted. For the data that were neither symmetrical nor normally distributed, the non-parametric paired sign test was conducted.

Discussion of Results

The results of the beach elevation survey conducted in January 2001 are shown in Appendix A. A three-dimensional figure was developed to depict the current topography of the beach project area using this current elevation data (Figure 3). The historical elevation data is also found in Appendix A.

The highest elevations were associated with the peaks of the beach dunes which ran parallel to the 75-meter and 100-meter transects. The elevation of the area toward the beach rapidly decreased while the elevation of the area behind the beach dunes gradually decreased. There were no visible indentations in the shoreline. There was one area located adjacent to the pipeline transect and one area near the W2 transect which were less vegetated and showed signs of overwash; however, the elevation of the area adjacent to the pipeline was actually higher than other areas.

Shoreline erosion in the project area, which has been documented from 1980 to 1998, measures 279 meters (average of 15.5 meters per year); however, the majority of erosion (175 meters) has resulted from four periods of severe storm activity, and some years have measured no erosion at all (Visser *et al.* 1999) *[4]*. These erosion rates are similar to other portions of the Louisiana shoreline. It is noted that a sand-trapping fence was installed on the beach in March 1994 which may have helped reduce erosion.

The results from the summary statistics, including the arithmetic mean, standard deviation, and coefficient of variance are shown in Table 1. The largest coefficient of variance (0.71) among the twenty-one sets of data was for the W1 transect at the distance of 75 meters which indicates the data at this point are the most variable. Other coefficients of variance range from 0.20 to 0.47. These values suggest that overall the data are relatively stable over the time period of consideration.

Figure 4 depicts the chronological change of the beach elevation data for the 75-, 100-, and 125-meter transects on the pipeline transect. This plot indicates a trend where the elevations at the 125-meter transect slightly increased over time and then decreased. As this decrease occurred, the elevations at the 75-meter and 100-meter transects increased. This suggests that as the 125-meter transect succumbed to erosion, the 75-meter and 100-meter transects established themselves as peaks in the beach-dune complex. These trends were similar for all east and west transects.

Comparison between Transects and the Pipeline Transect

Of the 18 comparisons between the pipeline and transect elevation data for the corresponding distances, significant difference was found in ten comparisons between the pipeline and transect elevation data (Table 2). Of the 12 locations to the east of the pipeline, there was significant difference at eight (67%) locations and no significant difference at four (33%) locations. Of the six locations to the west of the pipeline, there was significant difference at two (33%) locations and no significant difference at four locations (67%). A higher percentage of the sites to the east of the pipeline had significant difference than those sites to the west of the pipeline which suggests that the area on the west side of the pipeline was more stable over time.

Comparison between Transects

Of the six comparisons between the transects elevation data for the corresponding distances, significant difference was found between data on both sides of the pipeline in four comparisons. While there was no significant difference in the elevation data collected for E3 and W3 at the distances of 75 and 100 meters, there was significant difference between elevation data collected closer to the pipeline and further from the

pipeline. This suggests that although erosion along the beach is occurring, the beach elevation does not become more stable further from the pipeline as would be expected if the pipeline were contributing to erosion.

Conclusion

The beach topography appears to be relatively stable due to increased vegetative cover, installation of a sand-trapping fence and plantings, and a lack of severe storms in recent years. However, naturally occurring shoreline erosion has adversely impacted beach elevation by reducing the seaward expanse of the beach area. This is significant because the landward side of the beach is bordered by open water. Therefore, the overall acreage of the beach area is being naturally reduced by shoreline erosion rather than from the construction and operation of the LOOP pipeline.

BEACH VEGETATION

Introduction

The LOOP pipeline crosses the beach at Port Fourchon, Louisiana. The pipeline was constructed at a minimum of 10 feet below surface. The overlaying beach habitat at this pipeline crossing is an important land mass that protects and buffers the marsh to the north from storm surge, high energy wave action, and tidal flux. Coastal sand dunes are typically formed through the trapping of sand by dune vegetation. The shelter of the vegetation causes a decrease in wind velocity allowing sand that is carried in the air from the beach to be deposited (Willis *et al.* 1959) *[5]*. The type of vegetation found in dune habitats have adapted to the harsh conditions of coastal areas (Chapman 1976) *[6]*. These harsh conditions include high temperatures, dryness, occasional inundation by salt water, and the accumulation of sand (Cambers 1998) *[7]*.

As such, the LOOP pipeline crossing is vulnerable to erosion and overwash during storm events and by natural coastal processes. The project area for this survey is the same as the beach elevation survey and is shown in Figure 2.

Methodology

The beach vegetation survey was designed to collect and evaluate data to determine if existing vegetative conditions can be related to historical baseline data, specifically to determine if any impacts have occurred. The potential impacts were measured by surveying for plant species composition and percent vegetative cover. The beach vegetation survey was conducted using the same grid pattern established for the beach elevation survey and is shown in Figure 2.

A one-square meter plot was established on each transect intersection. The center location of each plot was entered into a GPS for incorporation into the GIS database. Each one-meter plot was surveyed for plant species composition and percent vegetative cover. The percent vegetative cover scale was based on a modified version of the Braun-Blanquet scale for plant community sampling. This scale was originally developed for the purpose of decreasing sampling time while maintaining a high level of accuracy in estimating relative abundance. The modified Braun-Blanquet scale is as follows: (+) < 1% cover; (1) 1-5%; (2) 6-25%; (3) 26-50%; (4) 51-75%; (5) 76-100%.

Frequency of occurrence analyses were calculated using PC SAS Version 8 for all species observed in the historical data set including the 2001 data. The beach vegetation data for the two most frequently occurring observed plant species, wire-grass (*Spartina patens*) and smooth cordgrass (*Spartina alterniflora*), were reviewed by cover rank for

the transects (E3 and W3) and distances (75 and 100 meters) for which comparisons were made in the beach elevation data.

Discussion of Results

The results of the beach vegetation survey conducted in January 2001 are shown in Appendix B. The results of the frequency of occurrence analysis from May 1988 through January 2001 are shown in Table 4. The number of identified plant species and the number of observations per survey are shown in Table 5.

The number of plant species observed was 18. The dominant species were wire-grass and salt grass (*Distichlis spicata*). Most plants were brown and dormant due to the time of year (winter) when the survey was conducted and there was evidence of a brush fire which may have reduced the number of plant species and vegetative cover.

Bitter panicum (*Panicum amarum*) which was previously recognized as a dominant dune species, was not observed at all, possibly due to the time of the year (winter) and the occurrence of a recent brush fire. In general, transition areas where the topography changes tend to show a higher vegetative cover and diversity of species. The vegetative cover has increased over the years in part due to the installation of a sand-trapping fence and plantings on the pipeline in March 1994 and a lack of severe storms in recent years.

Wire-grass occurrences for all locations on the survey grid increased from six in May 1988 to 33 in January 2001 (Figure 5), while smooth cordgrass decreased from 21 in May 1988 to two in January 2001 (Figure 6).

The May 1996 survey had the highest number of identified flora species at 21. The May 1993 survey had the highest ratio of identified plant species to number of observations (0.22) which indicates a greater diversity in species types observed while the January 2001 survey had the lowest ratio (0.13).

As shown in Table 6, both high and low ratios occur in the spring/summer and fall/winter surveys which indicates seasonality does not necessarily impact the ratio. The difference between the spring/summer average ratio and the fall/winter average ratio is 0.00 (0%). Other potential impacts to the number of plant species observed during the beach vegetation surveys may include annual rainfall, severe storms, severe drought in 2000, brush fire, extended periods of high or low temperatures, salt water intrusion, and wildlife. Since wire-grass is relatively fire resistant, and smooth cordgrass is not, brush fires may have an effect on the decreasing number of smooth cordgrass occurrences.

At the 75-meter distance, from October 1991 through January 2001, there were four occurrences of wire-grass on the E3 transect and ten occurrences on the W3 transect. The highest cover value of four (51-75%) was observed during the January 2001 survey

on the E3 transect at the 75-meter distance. Figure 7 illustrates the wire-grass cover ranks by survey year for the E3 and W3 transects at a distance of 75 meters. At the 100-meter distance, from May 1989 through January 2001, there are ten occurrences of wire-grass on the E3 transect and ten occurrences on the W3 transect. With the exception of the March 1990 survey, the cover values for wire-grass were higher on the E3 transect than on the W3 transect. Figure 8 illustrates the wire-grass cover ranks by survey year for the E3 and W3 transects at a distance of 100 meters. There were no occurrences of smooth cordgrass on the W3 transect at the 75- and 100-meter distances so transect comparisons could not be made.

There was no significant difference noted in the beach elevation data for the E3 and W3 transects at the distances of 75 and 100 meters. With 20 date-matched observations, paired comparison tests were used with the beach elevation data. As shown in Figure 7, there are only four out of a possible ten date-matched observations in the beach vegetation data and in Figure 8 there are only seven out of a possible 13 date-matched observations. Because of the small number of date-matched observations available, a paired comparison statistical test was not conducted with these data. The differences shown in Figures 7 and 8 for the wire-grass cover rank comparisons along the E3 and W3 transects at the distances of 75 and 100 meters qualitatively suggest that even a statistically insignificant elevation difference may impact wire-grass cover value. That is, slight changes in elevation may alter the cover rank in an area for wire-grass.

Conclusion

The beach vegetation has significantly increased in density and has stabilized over the years, even though the number of species and diversity were lower in 2001 than in previous years. The dominant species have changed over the years from wire-grass, smooth cordgrass, and bitter panicum to wire-grass and salt grass. Seasonality does not appear to influence the occurrence of any of the other plant species. Changes that are occurring in the project area appear to be the result of natural coastal processes rather than from the construction and operation of the LOOP pipeline.

GENERAL BIOLOGICAL OVERFLIGHT

Introduction

Many of the vegetation and wildlife components of the LOOP EMP have been reduced in frequency or eliminated over the years of study. To compensate for this, a general biological assessment comprising an overflight was added to the project to provide a relatively quick assessment of general biological conditions and water control structures (plugs) that were constructed at most water body crossings along the pipeline to reduce the flow and channelization from these water bodies. The overflight was designed to provide data on marsh vegetation, marsh condition, plug condition, and wildlife usage within the pipeline corridor and the surrounding marsh to determine if any impacts have occurred.

Methodology

The overflight was conducted in February 2001 and originated at the beach near Port Fourchon, Louisiana, and flew in a northerly direction over the pipeline corridor terminating at the Intracoastal Waterway. The pipeline was divided into seven sections as shown in Figure 9. The helicopter flew at an altitude of approximately 40 meters at approximately 45 knots per hour.

Observations were made concerning marsh vegetation, marsh condition, wildlife usage, and the condition of the plugs. The marsh vegetation was characterized by determining the percentage of vegetated versus non-vegetated marsh in the pipeline corridor and in the adjacent marsh. The marsh condition was assessed by utilizing a predetermined color index as an indicator of vegetation condition. Five classifications were used: green indicated healthy marsh condition; green/brown indicated the presence of some stressed plants; brown/green indicated a more stressed environment; brown indicated all stressed plants; and brown-lodged indicated one of several conditions including widely spaced brown plants, short brown/black plant stubble, or exposed soil. Wildlife including wading birds and waterfowl were identified and enumerated. The overflight was recorded using videography equipped with GPS capability. The video images were transferred into a GIS view for documentation and technical evaluation.

Discussion of Results

The results of the general biological overflight conducted in February 2001 are shown in Appendices C and D. The seven sections used in the overflight represent a gradient from fresh/intermediate marsh to saline marsh. In general, the two most

northern sections were mostly vegetated; ranging from 65% - 70% in the pipeline corridor, and 80% in the adjacent marsh. The vegetation was typically brown due to seasonal conditions (winter). The three intermediate sections were somewhat vegetated; ranging from 40% - 45% in the pipeline corridor and from 45% - 50% in the adjacent marsh. The two southernmost sections were only vegetated on the beach and occasional spoil banks; ranging from 5% - 10% in the pipeline corridor, and from 30% - 40% in the adjacent marsh.

Many different bird species were observed during the overflight (Appendix C). Waterfowl were abundant due to the time of the year (February). The most numerous bird species observed were American coot (*Fulica americana*), scaup (*Aythya affinis*), and double-crested cormorant *(Phalacrocorax auritus*). Numerous wading birds including snowy egret (*Egretta thula*), brown pelican (*Pelecanus occidentalis*), and great blue heron (*Ardea herodias*) were observed.

Plugs were located (Figure 9) and the structural integrity of each plug was assessed (Appendix D). Some plugs are in need of repair and/or maintenance to reduce the flow and channelization that are associated with salt water intrusion as a result of weather damage and possibly boat wakes.

Conclusion

In general, the condition of the marsh vegetation could not be properly assessed by the overflight alone, although there was no evidence of any unusual conditions within the pipeline corridor which would suggest a degrading marsh vegetation (i.e., marsh die-back, oil spills). Erosional processes were observed from the complex channelization of the marsh. Some plugs were identified that are in need of repair and/or maintenance to reduce the flow and channelization that are associated with salt water intrusion from the main water bodies into the pipeline corridor.

MUSKRATS

Introduction

The LOOP pipeline crosses over diverse marsh habitats in coastal Louisiana, which are inhabited by muskrats (*Ondatra zibethicus*). Muskrats are an important biological element in the marsh ecosystem due to their dependence on specific vegetation for food and shelter. Thus, a large population of muskrats can denude an entire habitat of vegetation (Mizelle 1936) *[8]*. Muskrats are also a food source for predatory animals such as alligators, bobcats, coyotes, raccoons, minks, and provide fur for trappers (Lowery 1974) *[9]*. Muskrat populations and movement may relate directly to the habitat type and quality.

Muskrats build dome-shaped houses by cutting and piling up cattails, bulrushes, or other aquatic vegetation. Some nests are eight feet or more in diameter at the base and have walls one to two feet thick, making these nests easily identifiable from an aerial perspective (O'Neil 1949) *[10]*. Historically, the highest densities of muskrat houses in the LOOP project area were observed in the brackish marsh along the west control transect. The plants most often used for food and nest building are saltmarsh bulrush (*Scirpus robustus*), smooth cordgrass (*Spartina alterniflora*) and black needlerush (*Juncus roemerianus*). These species are found typically in brackish marsh in south Louisiana.

Large fluctuations in muskrat populations in the brackish marsh represent typical conditions within southeastern Louisiana (Palmisano 1973) *[11]*. Several factors, including inter-specific competition, competition with other species for resources, the drought in 2001, and brush fires, may cause muskrats to migrate, causing wide discrepancies in population from year to year (Mizelle 1936) *[8]*. In addition, areas where levees and spoil banks (*i.e.*, hurricane protection levee near Golden Meadow) are present, muskrats may burrow into these structures rather than construct houses, therefore aerial observations may be underestimated (O'Neil 1949) *[10]*.

Methodology

For this survey, the number of muskrat houses, both active and inactive, were observed and used as an indicator of the population of muskrats in the project area. The muskrat study was designed to monitor populations and to determine whether marsh type or distance from the pipeline had an effect on the number or density of muskrat houses observed. The survey was conducted in the month of April because the spring season is

the height of muskrat house building and to avoid crossing over into the alligator nest building season.

The muskrat survey was conducted using a helicopter which flew along five transects that were arranged 800 meters apart and parallel to the pipeline corridor. One transect directly followed the pipeline. Two transects were established to the east of the pipeline, and two transects were established to the west of the pipeline and are shown in Figure 10. The coordinates of the transects were entered into an onboard GPS to ensure accuracy during navigation by the pilot. The transects were flown at an altitude of approximately 35 to 40 meters at approximately 100 knots per hour. The area observed on both sides of the helicopter was 90 meters wide.

The transects extend north from the beach where the pipeline enters from the Gulf of Mexico to St. James Parish. Each transect runs through one of three different marsh vegetation types (fresh/intermediate, brackish, and saline). Each house was evaluated for activity or inactivity.

The data were then analyzed by transect, activity or inactivity, and marsh type. The three marsh types for data collected from 1978 through 1996 were based on the Vegetative Type Map of the Louisiana Coastal Marshes (Chabreck and Linscombe 1978) *[12]*. In 2001, the marsh types were based on the Louisiana Coastal Marsh Vegetative Type Map (Chabreck and Linscombe 1997) *[13]* which defines five marsh types including fresh, intermediate, brackish, saline, and non-marsh. For comparative purposes, fresh and intermediate were added together and non-marsh was excluded because no historical data for non-marsh was available.

Historical data collected prior to July of each year were selected for study and designated for the purpose of this study as the spring dataset notwithstanding 1978 because it did not include data for the east and west control transects. Each of the data subsets was considered with respect to marsh type and transect location using Analysis of Variance (ANOVA).

Densities of houses were used in lieu of actual numbers of houses to account for differences in the size of the marsh type areas over the years. Densities were calculated by dividing the number of houses by the number of 100 hectares for the specific marsh type. Table 7 includes the area of marsh type used in previous years and used in the 2001 survey.

Active Houses

The active house data were analyzed using time series graphics to illustrate both the change in average number of active houses without respect to all marsh types and transect locations and the change in density with respect to marsh type and transect

location. The average number was calculated from the total number of houses divided by the number of transects with observations in order to normalize the data. ANOVA was used to determine impacts on the density of active houses.

Active and Inactive Houses

The active and inactive house data were analyzed using time series graphics to illustrate both the change in average number of active and inactive houses without respect to all marsh types and transect locations and the change in density of active and inactive houses with respect to marsh type and transect location. ANOVA was used to determine impacts on the density of active and inactive houses.

Discussion of Results

The results of the muskrat survey conducted in April 2001 are shown in Table 8. The total number of active and inactive muskrat houses observed were 85 and 42, respectively. The brackish marsh, followed by the salt marsh and fresh/intermediate marsh, contained the most active houses which is typical of the findings from other studies (O'Neil 1979) *[10]*. Most houses were observed in the east pipeline and east control, and west pipeline and west control, but not in the pipeline corridor.

Active Houses

The change in the number of active houses from 1979 through 2001 without respect to marsh type or transect location is illustrated in Figure 11. The highest number of active houses was observed during 1992. The lowest number of houses was observed in 2001.

The difference in density of active houses per 100 hectares attributable to marsh type is illustrated in Figure 12. From 1979 through 2001, the density of active houses, from highest to lowest, were: brackish, saline, and fresh marshes.

The difference in density of active houses per 100 hectors attributable to transect is illustrated in Figure 13. The highest densities were observed in the west control in 1991 and 1992. The lowest densities were observed in the east control from 1986 through 1990. In general, there is a cyclical change in average density of active houses with a peak density observed in 1992 and a less prominent peak in 1984.

The results from the ANOVA of the ranked densities of active muskrat houses observed during surveys conducted during the Spring months of 1979 through 2001 are shown in Table 9. Two of the main effects (year and marsh) significantly impact the density of active houses. The interaction of transect location and year does not significantly impact the density of active houses, while the interactions of marsh type and

year and transect location and marsh type do significantly impact the density of active houses.

Location on the pipeline transect was not significant when compared to all other transect locations, even though the data from 2001 would suggest otherwise. Similarly, location on the pipeline transect was not significant when compared to the east and west control transects. In addition, there was no significant difference between the density of active houses on the east pipeline when compared to the west pipeline transect. The results from a Ryan-Einot-Gabriel-Welsh (REGW) Multiple Range Test indicated that there was no significant difference between the means of the ranked densities among the five transects.

Among the marsh contrasts, the mean ranked density of active muskrat houses in the brackish marsh was not significantly different when compared to the mean ranked density of active muskrat houses in the fresh and saline marsh. There was a significant difference when the ranked densities of active muskrat houses in the saline marsh were compared to the ranked densities of active muskrat houses in the brackish and fresh marsh, and there was a significant difference when the ranked densities of active muskrat houses in the fresh marsh was compared to the ranked densities of active muskrat houses in the brackish and saline marsh. The results of the REGW Multiple Range Test indicated that there was significant difference between the means of the ranked densities of houses in the brackish, fresh, and saline marsh. The highest ranked mean density was in the saline marsh, followed by the brackish marsh and the fresh marsh.

Active and Inactive Houses

The change in the number of active and inactive houses from 1979 through 2001 without respect to marsh type or transect location is illustrated in Figure 14. The highest number of active and inactive houses was observed during 1992. The lowest number of houses was observed in 2001.

The difference in density of active and inactive houses per 100 hectares attributable to marsh type is illustrated in Figure 15. From 1979 through 1992, the highest density of active houses was in the brackish marsh. From 1992 through 1996, density was higher in the saline marsh than in the brackish marsh. In general, the lowest density of active and inactive houses was in the fresh marsh.

The difference in density of active and inactive houses per 100 hectares attributable to transect is illustrated in Figure 16. The highest densities were observed in the west control in 1991 and 1992. The lowest densities were observed in the east pipeline. In general, there is a cyclical change in average density of active and inactive houses with peak density occurring in 1992 and a less prominent peak in 1984.

The results from the ANOVA of the ranked densities of active and inactive muskrat houses observed during surveys conducted during the Spring months of 1979 through 2001 are shown in Table 10. Two of the main effects (year and marsh type) significantly impact the density of active and inactive houses. The interaction of transect location and year did not significantly impact the density of active and inactive houses, while the interactions of marsh type and year, and transect location and marsh type did significantly impact the density of active and inactive houses.

Of the transect contrasts, location was not significant. Note that these results are similar to those shown in Table 9 for the active houses. The results from a REGW Multiple Range Test indicated that there was a significant difference between the means of the ranked densities of active and inactive muskrat houses for the east control transect when compared to the mean ranked density along the other four transects and the east pipeline transect when compared to the other four transects. There was no significant difference between the means of the ranked densities of active and inactive muskrat houses for the east control, west control, west pipeline, and pipeline transects. In addition, there was no significant difference between the means of the ranked densities of active and inactive muskrat houses for the west control, pipeline, east pipeline, and west pipeline transects.

Of the marsh contrasts, the density of active and inactive muskrat houses in the brackish marsh was significantly different when compared to the density of active muskrat houses in the fresh and saline marsh. There was a significant difference when the ranked densities of active and inactive muskrat houses in the saline marsh were compared to the ranked densities of active muskrat houses in the brackish and fresh marsh, and there was a significant difference when the density of active and inactive muskrat houses in the fresh marsh was compared to the density of active muskrat houses in the brackish and saline marsh. The results of the REGW Multiple Range Test indicated that there was significant difference between the means of the ranked densities of active and inactive houses in the brackish, fresh and saline marsh. The highest mean of the ranked densities is in the saline marsh, followed by the brackish marsh and the fresh marsh. The highest mean ranked density of active and inactive muskrat houses was observed in 1991 and the lowest in 2001.

Conclusion

Most muskrat houses were observed in the brackish marsh. There is no significant difference between the historical data for the pipeline transect and other transects. This suggests that the fluctuations in the muskrat population numbers are not attributable to

impacts caused by construction and operation of the LOOP pipeline as much as by cyclic trends and habitat type.

WADING BIRD/SEABIRD ROOKERIES

Introduction

The LOOP pipeline crosses over diverse marsh habitats in coastal Louisiana which are inhabited by many species of wading birds and seabirds. Such species can be an important wildlife parameter in ecological monitoring because they represent a higher trophic level in the ecosystem and, for the most part, are resident species (Keller *et al.* 1984) *[14]*. During the nesting season, the birds are colonial and will construct a deep cup of dead reeds among beds of bulrushes, on floating mats of dead plants, or they may nest in trees. The large colonies in which birds nest are called rookeries and may consist of thousands of birds. Thus, the wading bird/seabird rookeries survey was designed to collect and evaluate data to determine if the existing number of birds can be related to historical baseline data, specifically to determine if any impacts have occurred.

Methodology

Wading bird/seabird rookeries were quantified by measuring the number of birds and rookeries within the project area which encompassed the Barataria – Terrebonne Estuary from Barataria Bay to the Lower Atchafalaya River. The survey was conducted in the month of June in order to monitor the birds during their nesting season when the rookery population is at its peak size.

The survey was conducted using a helicopter flight within the project area which was divided into smaller sections by using a grid system. The project area was surveyed for previously identified rookeries as well as new rookeries. Once a rookery was identified, the helicopter circled the area while data consisting of species composition, species count, and habitat occupancy were collected. Each rookery was coded and the location point collected with a GPS unit. The location of each rookery was recorded and plotted on Figure 17, which also shows the rookeries observed in 1997 (the last survey conducted). The arithmetic mean, standard deviation, and coefficient of variance were calculated as shown in Table 11.

Discussion of Results

The results of the wading bird/seabird rookeries survey conducted in June 2001 are shown in Appendix E. The overall number of rookeries has increased from 45 in 1998 to 72 in 2001 as well as the total number of birds counted from 50,662 in 1998 to 87,174 in 2001 as shown in Table 11 and Figure 18. These numbers represent the highest

number of rookeries reported and the second highest number of birds counted. The coefficient of variance for the historical data for number of rookeries and birds observed is 0.21 and 0.34, respectively, which suggests that the data are relatively stable over the time period of consideration. Also, small nesting groups of roseate spoonbill (*Ajaia ajaja*) were observed in the project area which are making a recovery in this coastal area.

In general, seabird rookeries located in the south were confined to islands. The marsh type was saline and the dominant seabirds observed were pelicans, terns, and gulls. The most abundant species observed was the laughing gull (*Larus atricilla*). Wading bird rookeries dominated the project area in the north. The marsh type was fresh/intermediate and the dominant wading birds observed were egrets and herons. The most abundant species observed were the white ibis (*Eudocimus albus*) and the great egret (*Casmerodius albus*).

The largest rookery observed was located at Raccoon Point, a barrier island, in the southwestern portion of the project area. Barrier islands are highly susceptible to erosion and land loss, therefore this rookery is sensitive to environmental change and could be displaced in the future.

Conclusion

The number of rookeries and total number of birds counted in 2001 were higher than in previous years. Increases in open water habitat along the LOOP pipeline and the adjacent marsh appear to attract wading birds and seabirds. However, land use within the project area has changed over the time period of consideration and may impact wading bird and seabird rookeries in the future.

VEGETATION BIOMASS

Introduction

Primary production is a measure of net photosynthesis within a given area and is used as a key index of ecosystem function (Mitsch and Gosselink 2000) *[15]*. Primary production can be measured in some areas by studies established to determine vegetation biomass. For this survey, net primary production is quantified by measuring the above-ground plant biomass that accumulates over a growing season.

Coastal land loss represents a loss of primary production. Thus, the current rate of land loss in coastal Louisiana of 32 square miles per year represents not only a significant loss of primary production, it also represents a loss of inherent wetland functions and values which provide the basis of extensive economic, environmental, and social benefits for Louisiana and the nation (Gagliano *et al.* 1981, Barras *et al.* 1994, DeLaune *et al.* 1991) *[16], [17], [18]*.

During the past 20 years, an intensive scientific effort has focused on determining the causes of Louisiana's rapid rate of coastal land loss. This land loss is the end product of a process of marsh deterioration resulting in a loss of surface elevation and subsequent conversion of land to shallow, open water (Turner 1990, Pezeshki and DeLaune 1996) *[19], [20]*.

The causes of coastal land loss result from both natural and anthropogenic activities which are closely interrelated and ultimately influenced. Two primary indicators of land loss include increased saltwater intrusion and conversion of fresh and intermediate marsh to saline marsh (Salinas *et al.* 1986, Reed and Cahoon 1993) *[21], [22]*. During this process, vegetative growth and organic accumulation can be slowed and the soil surface can become permanently inundated resulting in land loss (Mendelssohn and Burdick 1988, Nyman and DeLaune 1991) *[23], [24]*.

Thus, the vegetation biomass survey, which measures the above-ground biomass and tracks species diversity within a specific marsh over time, may serve as an indicator of the future sustainability of that marsh.

Methodology

The vegetation biomass survey was designed to collect and evaluate data to determine if existing vegetative conditions can be related to historical baseline data, specifically to determine if impacts have occurred. The potential impacts were quantified by measuring vegetation species presence and abundance and net primary production at sampling points in fresh, intermediate, and brackish marshes.

The vegetation biomass survey was conducted in fresh, intermediate, and brackish marshes in order to represent the different marsh types run through by the LOOP pipeline. Sampling points were established along transects with a GPS for location control (Figure 19). The above-ground biomass was harvested at each sampling point. Both the live and dead plant material were clipped at ground level, placed in plastic bags, labeled, and stored for shipment to the laboratory. At the laboratory, the live biomass was separated from the dead, and the live plants were sorted and counted by species. The sorted biomass was then oven dried at approximately 65° Celsius for 24 hours. The following parameters were recorded:

- Species present
- Stem count by plot and species
- Stem density by species
- Live biomass (dry weight) by species
- Dead biomass (dry weight)

Vegetation biomass data collected during the fall surveys from 1978 through 2001 were evaluated. Variables considered included: marsh type (brackish, fresh, and intermediate), plot type (experimental and control), size of plot, distance from the pipeline, transect, dry weight in milligrams per square meter (mg/m^2), and number of stems.

Fresh Marsh

The fresh marsh consisted of three transects: A, B, and C. The experimental Transects A and B were 200 meters long with the sampling points spaced at 20-meter intervals perpendicular to the pipeline canal. Transects A and B were replicated with sample points located along both the right and left side of the transect line. Transect C denotes the control transect perpendicular to an access canal. Transect C was 300 meters long with sampling points spaced at 30-meter intervals. Along the experimental transects (Transect A or B), the plot numbers increase as the distance from the pipeline increases. Along the control transect (Transect C), plot numbers increase as the distance from the canal increases.

Fresh marsh vegetation biomass data selected for review were from experimental Transects A and B. Annual average dry weight yields along Transects A and B in the fresh marsh were compared to the control transect. There are 17 years of data (1980 through 2001), two plot types (experimental and control), and two distance values (near and far) for the Transect A experimental plot records for which ANOVA was used. There are 17 years of data (1980 through 2001), two plot types (experimental and control), and

two distance values (near and far) for the Transect B experimental plot records for which ANOVA was used.

Intermediate Marsh

The intermediate marsh consisted of four transects: A, P, S, and C. Transect C denotes the control transect for the wire-grass (*Spartina patens*) marsh and Transect S denotes the control transect for the bulltongue (*Sagittaria lancifolia*)/coastal arrowhead (*Sagittaria falcata*) marsh. Transect P denotes the pipeline transect. The control transects and Transect P extended 200 meters with sample points spaced at 20-meter intervals. Transect A extended only 100 meters with sampling points spaced at 30-meter intervals. The length of Transect A was shortened due to the location of a body of water at the end of the transect line. Transects A and P were replicated with sample points located along both the right and left side of the transect line.

Intermediate marsh vegetation biomass data selected for review were the wire-grass records along the pipeline transects (P, PR, and PL) and the control transect (C). Also selected for review from the intermediate marsh vegetation biomass data were the records for bulltongue and coastal arrowhead along the experimental transects (A, AR, and AL) and the control transect (S). It is noted that in previous years, both bulltongue and coastal arrowhead were identified as *Sagittaria lancifolia* for statistical analysis. For the *Spartina patens* analysis, annual average dry weight yields were compared from Transect P and the control transect. Rather than use all of the intermediate marsh records, only those for wire-grass were used for the ANOVA. Records from experimental transect (P, PL, PR) and control transect (C) were used. There are 21 years of data (1978 through 2001), two plot types (experimental and control), and two distance values (near and far) for the intermediate marsh records. For the *Sagittaria* analysis, the records for coastal arrowhead/bulltongue from experimental transect (A, AL, AR) and control transect (S) were used for the ANOVA analysis. There are 20 years of data (1979 through 2001), two plot types (experimental and control), and two distance values (near and far) for the intermediate marsh records.

Brackish Marsh

The brackish marsh consisted of one transect: A. The control transect is located on private land and was not sampled due to the denial of access to the transect by the landowner. Therefore, no control data were available for comparative analysis. Transect A extended 200 meters with sampling points spaced at 20-meter intervals. Transect A was replicated with sample points located along both the right and left side of the transect.

Discussion of Results

The results of the vegetation biomass survey conducted in October 2001 are shown in Appendix F.

Fresh Marsh

In all years except 2001, Transect A plot average dry weight yields were greater than control transect plot average dry weight yields as shown in Figure 20. Transect B plot average dry weight yields were lower than control transect plot average dry weight yields except for 1991 and 1994 as shown in Figure 21. Marshes typically exhibit an "edge-effect" where the above-ground productivity is higher along stream banks than in the inland marsh areas (Mitsch and Gosselink 2000, Mendelssohn and McKee 1988) *[15], [25]*. Figures 22 and 23 illustrate the dry weight yields for each plot number in Transects A and B, respectively, compared to Transect C (control). "Edge-effect" was evident in Transects A and B in 2001, but not in the comparative analysis of historical data.

The results from the ANOVA for Transect A are shown in Table 12. The distance variable is not statistically significant. Weather conditions implicit in the year variable are statistically significant at the 99% confidence level. Means comparative analysis, using the REGW Multiple Range Test, confirms the results from the ANOVA model.

The results from the ANOVA for Transect B are shown in Table 13. The distance variable is statistically significant at 95% confidence level. Weather conditions implicit in the year variable are statistically significant at the 99% confidence level. Means comparative analysis, using the REGW Multiple Range Test, confirms the ANOVA result that the difference in dry weight yields between Transect B experimental and control plots is not statistically significant.

Intermediate Marsh-*Spartina patens*

As shown in Figure 24, the highest average experimental plot (Transect P) dry weight yields occurred in 1988 and 1992. Lowest average experimental plot dry weight yields occurred in 1987 and 1993. Control plot (Transect C) dry weight yields track the experimental plot yields in most years. In Figure 25, dry weight yield for 2001 is shown by plot type (experimental and control) and plot number. "Edge-effect" was not evident.

Results from the analysis are shown in Table 14. The distance variable is not statistically significant. Weather conditions implicit in the year variable and plot type are statistically significant at the 99% confidence level. Means comparative analysis, using the REGW Multiple Range Test, determined that ranked dry weight yield is greater from experimental plots than from control plots, but is not significantly different.

Intermediate Marsh-*Sagittaria*

As shown in Figure 26, the highest average experimental plot (Transect A) dry weight yields occurred in 1990 and 1997. The lowest average experimental plot dry weight yield occurred in 1986. Control plot (Transect S) dry weight yields generally track the experimental plot years during most years.

Figure 27 illustrates dry weight yield for 2001 by plot type (experimental and control) and plot number. Experimental plot average dry weight yields in 2001 increased with distance from the pipeline. There was only one control plot for which *Sagittaria* data were collected during 2001. That yield exceeded the yields from the four experimental plots.

Results from the analysis are shown in Table 15. The distance variable is not statistically significant. Weather conditions implicit in the year variable is statistically significant at the 99% confidence level. The interaction variable, plot type X year is statistically significant at the 95% confidence level. Means comparative analysis, using the REGW Multiple Range Test, determined that ranked dry weight yield is greater from experimental plots than from control plots, but is not significantly different.

Brackish Marsh

The species composition of this marsh has remained relatively the same where the dominant species were smooth cordgrass, wire-grass, and salt grass (*Distichlis spicata*). The biomass data from 2001 did not appear to follow any recognizable trends such as "edge-effect."

Conclusion

The species composition of the marsh has remained relatively the same where the dominant species are smooth cordgrass, wire-grass, and salt grass (*Distichlis spicata*).

In the fresh marsh, one experimental transect showed an increase in biomass when compared to the control, while another experimental transect showed a slight decrease in biomass as shown in Figures 20 and 21. Although this analysis shows differences, no data indicates that a permanent decline in biomass has or is occurring within the fresh marsh.

In the intermediate marsh, results were similar to the fresh marsh because individual data points from both experimental transects (wire-grass and bulltongue) show increased and decreased biomass when compared to the control, but no trend indicating a decline in biomass is evident.

CLOVELLY RADIAL TRANSECTS

Introduction

The LOOP pipeline crosses a large portion of marsh in coastal Louisiana which the Clovelly Salt Dome is located. The study area for this survey is comprised of 12 transects of varying length, which radiate from the Clovelly Salt Dome Oil Storage Facility and are shown in Figure 28. The Clovelly radial transects survey was designed to collect and evaluate data to determine if existing vegetative conditions can be related to historical baseline data, specifically to determine if changes have occurred.

As discussed in the vegetation biomass survey, changes in vegetative diversity such as an increase in vegetative species typical of saline marsh, may indicate a significant change in the ecosystem structure.

Several processes have been associated with the decline of bulltongue including physical stresses associated with excessive plant submergence as a result of marsh subsidence (McKee and Mendelssohn 1989) *[26]*, salt water intrusion (Webb and Mendelssohn 1996), high soil sulfide concentrations (Webb and Mendelssohn 1996) *[27]*, and herbivory (Ford and Grace 1996) *[28]*. Since bulltongue is a marsh type indicator within the project area for this survey, tracking its dominance or disappearance may indicate a changing marsh environment.

Methodology

The Clovelly radial transects survey was conducted to identify potential vegetative changes surrounding the Clovelly Salt Dome Oil Storage Facility. Species composition and cover were quantified along transects radiating from the Clovelly Salt Dome Oil Storage Facility, which is located in mostly in intermediate marsh. The 12 transects were established and varied in length from 3.5 to 12.0 kilometers, all radiating outward from the center of the salt dome as shown in Figure 28. The varying transect lengths were based on each transect extending outward until it reached an open water body or a non-wetland habitat type. The sampling points were spaced at 0.5-kilometer intervals along each transect. Two one-meter plots were located at each transect point on the right and left side of the transect line. Sampling points were geographically positioned using GPS and were to be entered into a GIS database.

Sampling points were accessed via airboat. A one square meter polyvinyl chloride (PVC) frame was used to accurately measure the quadrant size on each side of the transect. Vegetation in each plot was identified and a percent cover value rank was assigned to each species. A cover value rank was assigned to the sighting of each species

using a modified Braun-Blanquet scale where: X=trace; 1=1-25%; 2=26-50%; 3=51-75%; 4=76-99%; and 5=100%. Because the survey was conducted on each side of the transect, cover values were assigned as right and left ranks for each sampling point.

Vegetative cover data collected from 1981 through 2001 was evaluated where both right and left side cover data was also available for a given year. Frequencies of occurrence for each species by survey year were calculated using PC SAS Version 8. Missing values were not included in the frequency counts.

Survey data for comparative analysis were selected from four species: bulltongue, coastal waterhyssop (*Bacopa monnieri*), smooth cordgrass (*Spartina alterniflora*), and wire-grass. Percent values shown on Figure 29 were calculated from the actual number of records for which a cover value was assigned on both sides of the survey flight path for one of the four species. The percent values shown were standardized to 100% so that the numbers can be compared on the same basis.

A sediment sample was collected from each sampling point that did not fall on open water. Each sample was analyzed for chloride (Cl^-) by ion chromatography (Method 4110B) and salinity was calculated by multiplying the Cl^- value times a constant (1.80655).

Discussion of Results

The results from the Clovelly radial transects survey conducted in October 2001 are shown in Appendix G. The transects to the south were dominated by wire-grass (*Spartina patens*) and the transects to the north were dominated by wire-grass, but had a higher occurrence of bulltongue (*Sagittaria lancifolia*) suggesting that the north may be becoming more saline.

The change in occurrence of the four vegetation types selected is illustrated in Figure 29. Wire-grass was the dominant species among the four species. The number of occurrences of smooth cordgrass increased from 1997 to 2001 whereby it became more abundant than bulltongue and coastal waterhyssop. These data indicate a change in the diversity of vegetation in the marsh ecosystem.

Tables 16 through 19 illustrate the number of observations recorded (frequency of occurrence) of bulltongue, coastal waterhyssopp, smooth cordgrass and wire-grass during the survey years from 1981 through 2001. Bulltongue occurred most frequently in the northern transects (T10) and least frequently in the eastern transects (T5 – T7). Smooth cordgrass occurred most frequently in the southern transects (T3 and T4) and least frequently in the northern transects (T5 – T12). Wire-grass appeared in all transects, and Coastal waterhyssop occurred more frequently in the southern transects (T2 – T5).

Percent cover ranks of wire-grass at each sampling point along the T5 and T10 transects are summarized in Tables 20 and 21. These transects had the highest number of ranked coverage values as shown in Tables 16 through 19. Both left and right ranks are shown in Tables 20 and 21, and all ranks are averaged and shown in the left column.

Analytical results for the sediment samples for Cl^- and salinity are shown in Appendix H. The values for Cl^- ranged from 372 to 7,724 mg/L, which are consistent with values expected from an intermediate marsh.

Conclusion

Although change in ranked coverage data was shown from one survey year to the next, it was not readily apparent from the ranked coverage data that the change is attributable to proximity to the salt dome. Wire-grass was the most dominant species in the project area. Throughout the years, wire-grass has remained relatively stable in the frequency of occurrences.

Bulltongue has decreased since 1989 along four transects to the southeast of the salt dome, yet increased during 1993 and 1997 along transects to the northwest (T11 and T12), north (T9 and T10), and northeast (T8) of the salt dome. The transects containing decreasing numbers of bulltongue are located in areas of eroding marsh and may be the result of salt water intrusion. The transects which contain increasing numbers of bulltongue are located in areas which appear to be more stable, and thus, would not be as susceptible to salt water intrusion or marsh subsidence.

WADING BIRDS AND PELICANS

Introduction

The LOOP pipeline crosses over diverse marsh habitats in coastal Louisiana which are inhabited by wading birds and pelicans. The project area for the wading birds and pelicans survey consisted of transects that paralleled the LOOP pipeline corridor. The northern boundary is the Intracoastal Waterway at Delta Farms, and the southern boundary is the Gulf of Mexico. Wading bird species are an important wildlife parameter in ecological monitoring because they represent a higher trophic level in the ecosystem, and for the most part, are resident species (Keller *et al.* 1984) *[14]*.

Methodology

The wading birds and pelicans survey was conducted using a helicopter which flew along five transects that were arranged 800 meters apart and parallel to the pipeline corridor. One transect directly followed the pipeline. Two transects were established to the east of the pipeline, and two to the west of the pipeline (Figure 30). The coordinates of the transects were entered into an on-board GPS to ensure accuracy during navigation by the pilot. The transects were flown at an altitude of approximately 35 to 40 meters and the transects were 400 meters wide.

The transects extend from the beach where the pipeline enters from the Gulf of Mexico to the Intracoastal Waterway, just above the Clovelly Farms. Each transect runs through different marsh vegetation types. For this survey, the marsh types were based on the Louisiana Coastal Marsh Vegetative Type Map (Chabreck and Linscombe 1997) *[13]*. Densities were calculated using the marsh areas shown in Table 22.

From 1978 through 2001, the number of surveys per year has been reduced. All of the wading bird species noted in 1978 were not present in all years and other species have been observed in later years. Observations have not been consistent along each of the transects or in each of the marsh types. Due to these data inconsistencies, the original experimental design is now random, rather than balanced. The most recent data are from November 2001. Before 2001, surveys were conducted in November 1998 and March 1999. In an effort to improve the balance of the experimental design and without more recent spring survey data to use with the November 2001 data, only November survey data were used to perform the analysis of historical wading bird survey data beyond 1998 using PC SAS Version 8.

Discussion of Results

The results of the wading birds and pelicans survey conducted in November 2001 are shown in Appendix I. A total of 2,386 birds were observed along the five transects within the LOOP pipeline corridor: 1,618 in the saline marsh; 278 in the brackish marsh; and 490 in the fresh/intermediate marsh. The most abundant species observed were the White ibis (*Eudocimus albus*) and American white pelican (*Pelecanus erythrorhynchos*), which were primarily observed in the saline marsh. The average number of wading birds observed in the three marsh types during the November surveys from 1978 through 2001 is shown in Figure 31. The average number of wading birds was greatest in the brackish marsh during the November 1995 survey as shown in Figure 32.

Wading bird densities are shown in Table 23. Average wading bird density was greatest in saline marsh and lowest in the fresh/intermediate marsh. In 2001, the American white pelican had the highest density in brackish marsh and lowest in the fresh/intermediate marsh. Total average density over all marsh types and all species in 2001 was 28.62 (number per 100 hectares). By comparison, total average density over all marsh types and all species observed from historical data was 18.38 (number per 100 hectares).

The ANOVA results are shown in Table 24. There is a 99% probability that the three independent variables (year, marsh, and transect) and the two interaction variables (year X marsh and marsh X transect) significantly impact the density analysis of wading birds. There is a 95% probability that the interaction variable, year X transect, significantly impacts the density analysis of wading birds.

The REGW Multiple Range Test results show that the highest wading bird ranked density was in the fresh/intermediate marsh and the lowest was in the saline marsh. The highest wading bird ranked density was on the west pipeline transect and the lowest was on the east pipeline transect.

Construction of the LOOP pipeline was initiated in 1978 and operations began in 1981. The density of wading birds during the operation years of 1985 through 2001 was significantly greater than the density during the construction and early recovery years of 1978 through 1984.

The ANOVA results for all wading bird species are summarized in Table 25. Weather conditions implicit in the independent variable (year) significantly impact the density of ten out of 13 (77%) species. Only American anhinga (*Anhinga anhinga*), brown pelican (*Pelecanus occidentalis*), and green-backed heron (*Butorides striatus*) were not significantly impacted by the weather conditions implicit in the independent variable (year). Marsh type significantly influences the density of eight out of 13 (62%)

wading bird species. Transect location significantly influenced the results of five out of 13 (38%) wading bird species. The density of wading birds during the construction and early recovery years compared to the years of operation was significant (54% frequency).

A primary influence is the change of land use within the project area since 1981. That is, population increases in the Golden Meadow area and construction of the hurricane protection levee has resulted in a land use change whereby there is more non-marsh habitat than in previous years. Non-marsh habitat is not a primary habitat for wading birds and pelicans and may impact their population in the future.

Conclusion

The number of wading birds observed in 2001 were higher than in previous years. Increases in open water habitat along the LOOP pipeline and the adjacent marsh appear to attract wading birds and pelicans. However, land use within the project area has changed over the time period of consideration and may impact wading bird and pelican populations in the future.

SUMMARY OF CONCLUSIONS

Overall

- The objectives of the LOOP EMP were met by conducting the surveys detailed herein.
- Data was collected, evaluated, and maintained in order to identify impacts to the environment and their cause(s).

Beach Elevation

- The beach elevation appears to be relatively stable, but is threatened by naturally occurring shoreline erosion.
- The area on the west side of the pipeline appears to be more stable than the area on the east side.
- The area closest to the pipeline appears to be as stable as the area further from the pipeline.

Beach Vegetation

- The beach vegetation has significantly increased.
- The dominant species have changed from wire-grass, smooth cordgrass, and bitter panicum to wire-grass and salt grass.
- Seasonality does not appear to influence the occurrence of any of the plant species.
- Changes appear to be the result of natural coastal processes.

General Biological Overflight

- Waterfowl and wading birds were abundant.
- Erosional processes were observed from the complex channelization of the marsh.
- Some plugs are in need of repair and/or maintenance.

Muskrats

- Most muskrat houses were observed in the brackish marsh.
- There is no significant difference between the historical data for the pipeline transect and other transects.
- Previous studies indicate that muskrat populations are highly variable and cyclic.

Wading Bird/Seabird Rookeries

- The number of rookeries and total number of birds counted were higher than in previous years.
- A portion of the LOOP pipeline has become a shallow waterbody and conditions along the adjacent marsh are attractive to wading birds.

Vegetation Biomass

- The results indicate that vegetative biomass within the marsh has not adversely been impacted by the operation of the LOOP pipeline.
- In the fresh marsh, no data indicates that a permanent decline in biomass has or is occurring.
- In the intermediate marsh, no trends indicating a decline in biomass are evident.

Clovelly Radial Transects

- Wire-grass was the most dominant species in the project area.
- Bulltongue has declined in some areas due to marsh loss.
- Change in ranked coverage was observed, but it is not readily apparent that change is attributable to proximity to the salt dome.

Wading Birds and Pelicans

- The number of wading birds and pelicans observed was higher than in previous years.
- A portion of the LOOP pipeline has become a shallow waterbody and conditions along the adjacent marsh are attractive to wading birds.

RECOMMENDATIONS

The LOOP EMP should be redesigned to 1) incorporate current research regarding coastal processes and rate of land loss and 2) utilize current aerial mapping and remote sensing technologies as an initial monitoring tool that can be used to guide specific field investigations. Such technologies have been proven to satisfy the requirements of monitoring programs with goals and objectives similar to the EMP while minimizing the intrusion associated with field surveys in wetland environments. The recommendations are:

1. Incorporation of Current Research
   Since the initiation of the EMP, a significant body of research strongly suggests that habitat type and quality directly reflect wildlife sustainability. Thus, the monitoring of specific wildlife surveys should be replaced by either the existing or redesigned vegetative surveys to estimate net productivity and species composition.
2. Aerial Mapping/Remote Sensing Technologies
   Data generated by current, digital aerial mapping technology and commercially available spatial/spectral software should be used to accurately measure shoreline erosion at the beach crossing thereby eliminating the need for a separate beach elevation survey. These technologies could also be used to identify erosional processes that need immediate maintenance or that occur as a result of storm events. Assessments of primary production and vegetative diversity, two stated goals of the EMP, should also be evaluated utilizing this technology thus reducing the need for extensive field surveys associated with the vegetation biomass survey and the general biological overflight.
3. In addition to the recommendations above, it is recommended that the beach vegetations survey, conducted in January 2001, be conducted at a different time of the year, in April/May at the beginning of the growing season or in August/September at the end of the growing season, but not in January when plants are brown and dormant.

It is important to note that the requisite annual and biannual vegetation and wildlife surveys will be completed during the 2002 – 2003 survey. Upon completion of all surveys, a more definitive set of recommendations may be possible.

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Table 1
Beach Elevation
Summary Statistics of Elevation Data

Transect	Distance Meters	Mean Centimeters	Standard Deviation	Coefficient of Variance
E1	75	75.58	21.38	0.28
E1	100	95.78	41.14	0.43
E1	125	112.18	23.69	0.21
E2	75	54.46	25.07	0.46
E2	100	91.96	35.97	0.39
E2	125	117.91	27.34	0.23
E3	75	38.43	15.09	0.39
E3	100	90.59	28.92	0.32
E3	125	116.73	32.17	0.28
E4	75	32.80	6.73	0.21
E4	100	84.86	30.54	0.36
E4	125	126.40	39.77	0.31
PO	75	96.25	35.28	0.37
PO	100	118.74	49.09	0.41
PO	125	88.83	28.81	0.32
W1	75	66.13	46.63	0.71
W2	75	94.29	53.73	0.47
W2	100	113.63	30.13	0.27
W3	75	96.21	42.77	0.44
W3	100	106.62	23.09	0.22
W4	100	100.82	20.57	0.20

Table 2
Beach Elevation
Summary Statistics of Comparison between Transects and Pipeline Transect

Transect	Distance	Shapiro-Wilk CV	Shapiro-Wilk W Statistic	Normal Distribution Accept H_o: >=0.905	Paired t-test T Statistic Parametric Accept H_o: =<2.09	P(T<=t) Accept H_o: >0.05	Distribution of $d_o = \|x_1-x_2\|$ is Symmetric	Wilcoxon Signed Ranks S Statistic Non Parametric Accept H_o: > 52	P(S<=s)	Sign Test M Statistic Accept H_o: > 6	P(M<m)	Difference is Significant H_o: d_o=0 H_1: d_o<>0
E1	75	0.28	0.8368	No			yes	|-96|	0.0001			No
E1	100	0.43	0.9495	Yes	|-5.53|	0.0001						Yes
E1	125	0.21	0.9446	Yes	|4.21|	0.0005						Yes
E2	75	0.46	0.7800	No			yes	|-103|	0.0001			No
E2	100	0.39	0.9360	Yes	|-4.15|	0.0005						Yes
E2	125	0.23	0.9358	Yes	|3.57|	0.0020						Yes
E3	75	0.39	0.9497	Yes	|-9.97|	0.0001						Yes
E3	100	0.32	0.8684	No			no			|-7|	0.0026	No
E3	125	0.28	0.9420	Yes	|2.97|	0.0079						Yes
E4	75	0.21	0.9439	Yes	|-9.75|	0.0001						Yes
E4	100	0.36	0.8967	No			no			|-8|	0.0004	No
E4	125	0.31	0.9178	Yes	|3.12|	0.0056						Yes
PO	75	0.37	0.9107	Yes								
PO	100	0.41	0.9455	Yes								
PO	125	0.32	0.9694	Yes								
W1	75	0.71	0.7648	No			no			|-9|	0.0001	No
W2	75	0.47	0.8820	No			no			0	1.0000	Yes
W2	100	0.27	0.9612	Yes	|-0.62|	0.5424						No
W3	75	0.44	0.9022	No			yes	|-6|	0.8498			Yes
W3	100	0.22	0.9260	Yes	|-1.23|	0.2334						No
W4	100	0.20	0.9828	Yes	|-1.57|	0.1333						No

Table 3
Beach Elevation
Summary Statistics of Comparison between Transects

Transect	Distance	Shapiro-Wilk W Statistic	Normal Distribution Accept H_o: >=0.905	Paired t-test T Statistic Parametric Accept H_o: =<2.09	P(T<=t) Accept H_o: >0.05	Distribution of $d_o = \|x_1-x_2\|$ is Symmetric	Wilcoxon Signed Ranks S Statistic Non Parametric Accept H_o: > 52	P(S<=s)	Sign Test M Statistic Accept H_o: > 6	P(M<m)	Difference is Significant H_o: d_o=0 H_1: d_o<>0
E1	75	0.8368	No			No			|-1|	0.8238	Yes
E2	75	0.7800	No			No			|-6|		Yes
E2	100	0.9360	Yes	|-3.80|	0.0012						Yes
E3	75	0.9497	Yes			No			|-7|	0.0026	No
E3	100	0.8684	No			No			|-7|	0.0026	No
E4	100	0.8967	No			Yes	|-52|	0.0532			Yes
W1	75	0.7648	No						|-1|	0.8238	Yes
W2	75	0.8820	No						|-6|	0.0118	Yes
W2	100	0.9612	Yes	|-3.80|	0.0012						Yes
W3	75	0.9022	No			No			|-7|	0.0026	No
W3	100	0.9260	Yes			No			|-7|	0.0026	No
W4	100	0.9828	Yes			Yes	|-52|	0.0532			Yes

Table 4
Beach Vegetation
Frequency of Occurrence for Identified Plant Species Records from 1988 through 2001

Common Name	Scientific Name	Frequency of Occurrence	Percent of Identified Plant Species Records
Wire-grass	*Spartina patens*	298	23.45
Smooth Cordgrass	*Spartina alterniflora*	288	22.66
Bitter Panicum	*Panicum amarum*	160	12.59
Seaside Purslane	*Sesuvium portulacastrum*	77	6.06
Salt grass	*Distichlis spicata*	70	5.51
Seaside Goldenrod	*Solidago sempervirens*	64	5.04
Coast Drop Seed	*Sporobolus virginicus*	33	2.6
Large Leaf Pennywort	*Centella javanica*	33	2.6
Deer Pea Vetch	*Vicia ludoviclana Nutt.*	31	2.44
Common Reed	*Phragmites australis*	30	2.36
Narrowleaf Baccharis	*Baccharis angustifolia*	22	1.73
Catchfly Gentian	*Eustoma exaltatum*	17	1.34
Torpedo Grass	*Panicum repens*	17	1.34
Groundnut	*Apios americana*	15	1.18
Seashore Paspalum	*Paspalum vaginatum*	11	0.87
Sea Rocket	*Cakile edentula*	9	0.71
Woody Glasswort	*Salicornia virginica*	9	0.71
Eastern Baccharis	*Baccharis halimifolia*	8	0.63
Prostate Spurge	*Euphorbia supina*	8	0.63
Seashore Elder	*Iva Imbricata*	8	0.63
Beach Morning Glory	*Ipomoea imperati*	6	0.47
Saltmarsh Morning Glory	*Ipomoea sagittata*	6	0.47
Saltwort	*Batis maritima*	6	0.47
Sea Oxeye	*Barrichia frutescens*	6	0.47
Slender-Leafed Goldenrod	*Solidago tenuifolia*	6	0.47
Yellow Nutgrass	*Cyperus esculentus*	6	0.47
Bushy Beardgrass	*Andropogon glomeratus*	4	0.31
Northern Frogfruit	*Phyla lanceolata*	4	0.31
Common Threesquare	*Scirpus pungens*	2	0.16
Saltmarsh Fimbry	*Fimbristylis castanea*	2	0.16
Shortleaf Flatsedge	*Cyperus brevifolius*	2	0.16
Black Mangrove	*Avicennia germinans*	1	0.08
Broom Sedge	*Carex scoparia*	1	0.08
Coast Roast Gentian	*Sabatia calycina*	1	0.08
Common Frogfruit	*Phyla nodiflora*	1	0.08
Irisleaf Yellow Eye Grass	*Xyris laxifolia*	1	0.08
Joint Grass	*Calamagrostis canadensis*	1	0.08
Lamb's Quarters	*Chenopodium album*	1	0.08
Marsh Elder	*Iva frutescens*	1	0.08
Marsh Swallow Wort	*Cynanchum angustifolium*	1	0.08
Sea Lavender	*Limonium carolinianum*	1	0.08
Sea Oats	*Unida Paniculata*	1	0.08
Seabeach Grass	*Panicum Amarulum*	1	0.08
Silverhead	*Philoxerus vermicularis*	1	0.08

Table 5
Beach Vegetation
Number of Identified Plant Species by Survey

Survey Date	Number of Observations	Number of Plant Species	Species per Observations
May-88	69	9	0.13
Nov-88	44	6	0.14
May-89	52	7	0.13
Mar-90	78	11	0.14
Oct-91	92	15	0.16
Jun-92	121	18	0.15
Sep-92	59	11	0.19
May-93	54	12	0.22
Dec-93	61	10	0.16
Apr-94	59	12	0.20
Dec-94	71	12	0.17
May-95	103	20	0.19
Nov-95	80	15	0.19
May-96	100	21	0.21
Nov-98	86	16	0.19
Jan-01	142	18	0.13

Table 6
Beach Vegetation
Number of Identified Plant Species by Survey and Season

	Survey Date	Number of Observations	Number of Plant Species	Species per Observation
Spring/Summer	May 1998	69	9	0.13
	May 1989	52	7	0.13
	March 1990	78	11	0.14
	June 1992	121	18	0.15
	May 1993	54	12	0.22
	April 1994	59	12	0.20
	May 1995	103	20	0.19
	May 1996	100	21	0.21
	Average	79.5	14	0.17
	Standard Deviation	25.73	5.23	0.038
	Coefficient of Variation	0.32	0.38	0.22
Fall/Winter	November 1988	44	16	0.14
	October 1991	92	15	0.16
	September 1992	59	11	0.19
	December 1993	61	10	0.16
	December 1994	71	12	0.17
	November 1995	80	15	0.19
	November 1998	86	16	0.19
	January 2001	142	18	0.13
	Average	79.4	14	0.17
	Standard Deviation	29.76	2.80	0.023
	Coefficient of Variation	0.20	0.20	0.14

Table 7

Muskrats

Area of Marsh Types Along Transects

		Marsh Type (Hectares)			
Year	**Transect**	**Salt**	**Brackish**	**Fresh/Intermediate**	**Total**
1978	West Control	244	56	51	351
	West Pipeline	230	60	60	350
	Pipeline	238	57	96	391
	East Pipeline	241	62	152	455
	East Control	244	60	169	473
	Total	**1,197**	**295**	**528**	**2,020**
1997	West Control	226	48	89	363
	West Pipeline	202	51	129	382
	Pipeline	192	97	196	485
	East Pipeline	227	59	218	504
	East Control	236	47	203	486
	Total	**1,083**	**302**	**835**	**2,220**

Table 8

Muskrats

Number of Muskrat Houses Observed in 2001

Transect	Marsh Type							
	Salt		Brackish		Fresh/Intermediate		Total	
	Active	*Inactive*	*Active*	*Inactive*	*Active*	*Inactive*	*Active*	*Inactive*
West Control	11	2	11	5	0	1	22	8
West Pipeline	2	3	11	5	1	0	14	8
Pipeline	0	0	0	0	3	1	3	1
East Pipeline	7	5	2	1	7	9	16	15
East Control	4	3	15	1	11	6	30	10
Total	**24**	**13**	**39**	**12**	**22**	**17**	**85**	**42**

Table 9

Muskrats

ANOVA Results for Ranked Densities of Active Muskrat Houses Observed on Spring Surveys, 1979 – 2001

Source	Degrees of Freedom	Type I Sums of Squares	Calculated F Value	Pr > F	Critical Value α=0.05	
Year	18	460,730	30.54	<0.0001	1.61	**
Transect	4	8,095	2.41	0.0521	2.37	
Marsh	2	688,407	410.69	<0.0001	3.00	**
Transect X Year	72	81,453	1.35	0.0697	1.30	
Marsh X Year	36	209,973	6.96	<0.0001	1.43	**
Transect X Marsh	8	98,865	14.75	<0.0001	1.94	**
Error	130	108,955				
Contrasts						
Pipeline vs. Others	1	7	0.01	0.9284	3.84	
Pipeline vs. Controls	1	21	0.03	0.8740	3.84	
East vs. West	1	623	0.74	0.3902	3.84	
Brackish vs. Others	1	2,313	2.76	0.0990	3.84	
Saline vs. Others	1	638,235	761.51	<0.0001	3.84	**
Fresh vs. Others	1	406,052	484.48	<0.0001	3.84	**

** Significant difference: calculated F-statistic > critical value and Pr>F is less than 0.0500.

Model has an R-Square of 0.93 and a calculated F-statistic of 13.19 to test for equality of the factor level means. Critical value (α=0.05) is 1.00. Calculated F-statistic is greater than the critical value so the null hypothesis (factor means are equal) is rejected.

Table 10

Muskrats

ANOVA Results for Ranked Densities of Active and Inactive Muskrat Houses Observed on Spring Surveys, 1979 – 2001

Source	Degrees of Freedom	Type I Sums of Squares	Calculated F Value	Pr > F	Critical Value α=0.05	
Year	18	2,483,882	15.03	<0.0001	1.61	**
Transect	4	87,740	2.39	0.0505	2.37	
Marsh	2	3,336,704	181.69	<0.0001	3.00	**
Transect X Year	72	571,937	0.87	0.7710	1.30	
Marsh X Year	36	1,243,098	3.76	<0.0001	1.43	**
Transect X Marsh	8	781,925	10.64	<0.0001	1.94	**
Error	241	3,525,987				
Contrasts						
Pipeline vs. Others	1	5,091	0.55	0.4570	3.84	
Pipeline vs. Controls	1	4,198	0.46	0.4993	3.84	
East vs. West	1	1,112	0.12	0.7280	3.84	
Brackish vs. Others	1	61,961	6.75	0.0097	3.84	**
Saline vs. Others	1	3,568,119	388.59	<0.0001	3.84	**
Fresh vs. Others	1	1,748,995	190.48	<0.0001	3.84	**

** Significant difference: calculated F-statistic > critical value and Pr>F is less than 0.0500.

Model has an R-Square of 0.71 and a calculated F-statistic of 6.62 to test for equality of the factor level means. Critical value (α=0.05) is 1.00. Calculated F-statistic is greater that the critical value so the null hypothesis (factor means are equal) is rejected.

Table 11
Wading Bird/Sea Bird Rookeries
Number of Rookeries and Birds
Observed by Survey Year

Year	Total Active Rookeries	Total Birds Observed
1984	24	30,330
1985	47	95,530
1986	52	73,829
1987	49	70,980
1988	47	48,137
1989	44	56,492
1990	45	48,599
1991	51	43,435
1992	50	49,874
1993	44	36,760
1994	52	34,300
1995	59	56,525
1996	44	69,130
1998	45	50,622
2001	72	87,174
Standard Deviation	9.95	19,051.48
Coefficient of Variance	0.21	0.34
Mean	48.33	56,781.13

Table 12

Vegetation Biomass

ANOVA Results for Fresh Marsh Transect A

Independent Variable	Degrees of Freedom	Mean Square	F Value	Pr > F	Statistically Significant	Comments
Distance	1	6,518	0.01	0.9232	No	Far > Near
Year	16	4,690,944	6.68	< 0.0001	Yes (>99%)	1982 > 1981
Plot Type	1	90,457,745	128.84	< 0.0001	Yes (>99%)	Exp > Control
Plot Type X Year	15	1,328,255	1.89	0.0197	Yes (95%)	
Distance X Plot Type	1	12,075,374	17.20	< 0.0001	Yes (>99%)	
Model	34	5,809,370	8.27	< 0.0001	Yes(>99%)	
Error	2,984	702,098				
Corr. Total	3,018					

If Pr>F <0.0001 statistical significance of independent variable is > 99%
If Pr>F =< 0.0100 statistical significance of independent variable is at least 99%
If Pr>F =< 0.0500 statistical significance of independent variable is at least 95%

Table 13

Vegetation Biomass

ANOVA Results for Fresh Marsh Transect B

Independent Variable	Degrees of Freedom	Mean Square	F Value	Pr > F	Statistically Significant	Comments
Distance	1	7,129,047	5.68	0.0172	Yes (95%)	Far > Near
Year	16	10,030,522	7.99	< 0.0001	Yes (>99%)	1981 > 1982
Plot Type	1	9,555	0.01	0.9305	No	Control>Exp
Plot Type X Year	13	2,263,637	1.80	0.0370	Yes (95%)	
Distance X Plot Type	1	892,281	0.71	0.3991	No	
Model	32	6,185,829	4.93	< 0.0001	Yes(>99%)	
Error	3,909	1,254,883				
Corr. Total	3,941					

If Pr>F <0.0001 statistical significance of independent variable is > 99%
If Pr>F =< 0.0100 statistical significance of independent variable is at least 99%
If Pr>F =< 0.0500 statistical significance of independent variable is at least 95%

Table 14

Vegetation Biomass

ANOVA Results for Intermediate Marsh (*Spartina patens*)

Independent Variable	Degrees of Freedom	Mean Square	F Value	Pr > F	Statistically Significant	Comments
Distance	1	41,075	1.81	0.1795	No	Far > Near
Year	20	80,335	3.53	< 0.0001	Yes (>99%)	1988 > 1992
Plot Type	1	434,081	19.10	<0.0001	Yes (>99%)	Exp > Control
Plot Type X Year	18	63,566	2.80	<0.0001	Yes (>99%)	
Distance X Plot Type	1	459,767	20.23	0.0001	Yes (>99%)	
Model	41	89,898	3.96	< 0.0001	Yes (>99%)	
Error	481	22,727				
Corr. Total	522					

If Pr>F <0.0001 statistical significance of independent variable is > 99%
If Pr>F =< 0.0100 statistical significance of independent variable is at least 99%
If Pr>F =< 0.0500 statistical significance of independent variable is at least 95%

Table 15

Vegetation Biomass

ANOVA Results for Intermediate Marsh (*Sagittaria lancifolia* and *falcate*)

Independent Variable	Degrees of Freedom	Mean Square	F Value	Pr > F	Statistically Significant	Comments
Distance	1	5,958	0.88	0.1795	No	Far > Near
Year	19	96,116	14.14	< 0.0001	Yes (>99%)	1997 > 1995
Plot Type	1	356	0.05	0.8193	No	Exp > Control
Plot Type X Year	11	15,275	2.25	0.0128	Yes (95%)	
Distance X Plot Type	1	1,532	0.23	0.6354	No	
Model	33	60,669	8.92	< 0.0001	Yes(>99%)	
Error	247	6,799				
Corr. Total	280					

If Pr>F < 0.0001 statistical significance of independent variable is > 99%
If Pr>F =< 0.0100 statistical significance of independent variable is at least 99%
If Pr>F =< 0.0500 statistical significance of independent variable is at least 95%

Table 16
Clovelly Radial Transects
Frequency of Occurrence by Year and Transect of Bulltongue

Transect	1981	1982	1983	1984	1985	1989	1993	1997	2001	Total by Transect
T1	4	5	4	4	5	2	2	2	1	29
T2	8	6	7	5	7	0	2	2	1	38
T3	5	4	4	5	1	0	0	0	0	19
T4	5	3	1	3	3	0	0	0	0	15
T5	0	1	0	0	1	0	0	0	0	2
T6	0	1	0	0	1	0	0	0	0	2
T7	0	0	0	0	0	0	0	0	0	0
T8	1	1	2	1	2	2	3	2	3	17
T9	0	5	6	7	6	1	9	11	1	46
T10	1	3	5	6	7	2	9	10	7	50
T11	3	5	4	7	5	1	4	5	1	35
T12	4	5	5	6	6	1	6	5	0	38
Total by Year	31	39	38	44	44	9	35	37	14	291

Table 17
Clovelly Radial Transects
Frequency of Occurrence by Year and Transect of Coastal Waterhyssop

Transect	1981	1982	1983	1984	1985	1989	1993	1997	2001	Total by Transect
T1	0	1	1	0	2	1	1	2	0	8
T2	2	0	2	2	3	4	5	7	4	29
T3	3	2	4	2	5	3	3	8	3	33
T4	7	3	6	4	4	1	1	4	1	31
T5	3	1	3	3	3	2	2	2	0	19
T6	2	0	0	1	2	0	0	0	0	5
T7	0	0	0	0	0	0	0	0	0	0
T8	0	0	0	0	1	0	1	0	0	2
T9	0	0	0	0	1	0	1	0	0	2
T10	0	0	0	0	1	0	0	1	0	2
T11	0	1	2	1	0	1	0	1	0	6
T12	2	2	1	1	1	4	1	2	1	15
Total by Year	19	10	19	14	23	16	15	27	9	152

Table 18
Clovelly Radial Transects
Frequency of Occurrence by Year and Transect of Smooth Cordgrass

Transect	1981	1982	1983	1984	1985	1989	1993	1997	2001	Total by Transect
T1	0	0	0	0	0	1	1	1	1	4
T2	0	0	0	0	1	4	3	3	4	15
T3	3	2	4	5	6	6	5	5	5	41
T4	6	5	5	7	6	10	6	9	7	61
T5	1	0	1	0	0	1	0	0	2	5
T6	0	0	0	0	0	0	0	0	1	1
T7	0	0	0	0	0	0	0	0	1	1
T8	0	0	0	0	0	0	0	0	1	1
T9	0	0	0	0	0	0	0	0	0	0
T10	0	0	0	0	0	0	0	0	0	0
T11	0	0	0	0	0	0	0	0	0	0
T12	0	0	0	0	0	0	0	0	0	0
Total by Year	10	7	10	12	13	22	15	18	22	129

Table 19
Clovelly Radial Transects
Frequency of Occurrence by Year and Transect of Wire-grass

Transect	1981	1982	1983	1984	1985	1989	1993	1997	2001	Total by Transect
T1	0	1	2	2	1	3	4	5	4	22
T2	0	1	1	2	3	5	6	6	6	30
T3	1	2	2	4	1	4	11	7	3	35
T4	3	4	5	3	2	7	11	10	7	52
T5	16	13	13	14	17	14	18	14	9	128
T6	9	9	8	10	8	10	10	8	7	79
T7	6	5	5	5	4	6	6	5	5	47
T8	8	8	7	7	7	8	7	6	7	65
T9	13	13	13	13	11	13	14	11	12	113
T10	15	14	12	14	16	16	17	11	16	131
T11	10	9	9	9	11	13	12	13	13	99
T12	5	5	5	6	5	7	8	8	8	57
Total by Year	86	84	82	89	86	106	124	104	97	858

Table 20
Clovelly Radial Transects
Wire-grass Cover Rank Along Transect 5 by Sampling Point

Sample	1981		1982		1983		1984		1985		1989		1993		1997		2001		Average
Point	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Rank
T5-1	3	1			2	3			4	2	4	3	4	4	4	4			3
T5-2									1	3									2
T5-3									2	1			4	2	4	4	3	2	3
T5-4	2	5	1	2			3	5	4	2	4	4	4	5	3	4			3
T5-5	5	5	2	4	4	5	5	5	4	5	3	3	5	5	5	5	3	4	4
T5-6	3	4	5	5	3	4	3	4	3	3	4	4	5	5	4	5	1	2	4
T5-7	5	5	1	4	4	2	5	5	2	3	4	5	3	4	3	4	3	4	4
T5-8	4	5	5	5	2	5	4	4			4	5	4	5	4	5			4
T5-9	5	5	4	5	3	4	4	3	4	4	4	4	4	5	4	3			4
T5-10	5	4			3	3	4	4	2	1	4	3	3	5	3	3			4
T5-11	4	5	4	5	4	2	3	3	4	3	3	3	4	4			1	2	3
T5-12	5	5	2	3	2	3	3	2	1	4	2	4	4	3	2	3			3
T5-13	4	5	4	5	4	5	2	2	1	3	4	3	4	4					3
T5-14			3	1									1	2					4
T5-15	3	2							3	5			1	2					2
T5-16	3	4			5	5	2	5	3	4	4	3	5	3	1	2	2	1	2
T5-17	2	5	4	4	5	5	3	4	4	4	3	3	5	4	4	3	2	2	3
T5-18	2	4	5	3	2	2	4	4	3	4	3	2	2	5	3	4	2	2	4
T5-19	5	5	4	4			1	2	2	3	1		5	4	2	3			3
Total Occurrences by Year	16	16	13	13	13	13	14	14	17	17	14	14	18	18	14	14	9	9	

Table 21
Clovelly Radial Transects
Wire-grass Cover Rank Along Transect 10 by Sampling Point

Sample	1981		1982		1983		1984		1985		1989		1993		1997		2001		Average
Point	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Left	Right	Rank
T10-1	3	3	3	5	5	4	2	4	2	2	4	5	4	4	3	2	4	4	4
T10-2											2	4	4	3					3
T10-3	4	3	3	4	3	4	2	4	2	3	1	2	5	4			3	4	3
T10-4	3	1					3	4	3	2	4	5	2	4	3	2	2	3	3
T10-5	2	3	2	4	2	2	1	4	3	3	2	3	5	4	2	3	3	3	3
T10-6	3	2	4	4	1	2	3	3	3	2	3	4	4	4	4	2	4	2	3
T10-7	3	3	5	5	3	5	1	3	4	4	1	2	4	4			3	4	3
T10-8	2	5	4	3	5	4	4	2	4	5	3	2	4	4			3	3	4
T10-9	3	4	5	4	1	4	2	1	5	4	X	4	4	3	2	3	2	4	3
T10-10	5	4	3	2			1	2	2	3	5	3	4	3	4	4	4	4	3
T10-11	4	4	4	1	2	1	3	1	3	2	5	4	4	3	4	3	4	4	3
T10-12	4	3	4	1	4	4	4	3	2	2	4	5	5	4			3	2	3
T10-13	2	1	4	3	2	3	3	3	2	2	4	2	4	3	5	2	2	2	3
T10-14	2	5	4	4	5	4	5	4	3	4	5	5	4	4	4	3	4	4	4
T10-15	4	3	4	4	3	3	2	4	2	4	5	4	4	3	1	2	4	2	3
T10-16	2	4	1	X					2	2			1	1			3	4	2
T10-17									2	4	2	3	4	2	X	2	1	4	3
Total																			
Occurances																			
By Year	15	15	14	14	12	12	14	14	16	16	16	16	17	17	11	11	16	16	

Table 22

Wading Birds and Pelicans

Area of Marsh Along Transects

	Marsh Type			
Transect	**Brackish**	**Fresh/Intermediate**	**Saline**	**Total**
East Control	205	974	1050	2,229
East Pipeline	262	908	1008	2,178
Pipeline	430	864	854	2,148
West Pipeline	239	581	899	1,719
West Control	218	398	1003	1,619
Total	1,354	3,725	4,814	9,893

Table 23
Wading Birds and Pelicans
Densities of Wading Birds (number per 100 hectares) from 2001

Species	Marsh Type								
	Brackish Density	Brackish Number Observed	Fresh/ Intermediate Density	Fresh/ Intermediate Number Observed	Saline Density	Saline Number Observed	Total Number Observed	Weighted Average Density[1]	Rank by Weighted Average Density
American Anhinga	---	---	0.44	17	---	---	17	0.44	12
American White Pelican	11.21	47	0.10	1	9.23	355	403	8.49	1
Black-crowned Night Heron	0.38	1	0.43	6	0.10	1	8	0.34	13
Brown Pelican	1.16	6	---	---	0.71	25	31	0.86	10
Dark Ibis	---	---	---	---	1.34	28	28	1.34	7
Double-crested Cormorant	8.13	125	5.71	260	4.12	196	581	5.98	3
Great Blue Heron	2.16	31	1.18	46	1.75	84	161	1.70	6
Great Egret	3.14	42	2.07	66	4.05	198	306	3.09	5
Green Heron	---	---	0.22	2	---	---	2	0.22	14
Green-backed Heron	---	---	---	2	0.20	---	2	0.20	15
Little Blue Heron	1.09	8	1.91	25	1.08	53	86	1.31	8
Roseate Spoonbill	---	---	---	---	3.79	38	38	3.79	4
Snowy Egret	0.91	10	1.10	31	1.52	74	115	1.20	9
Tricolored Heron	0.56	5	0.39	12	1.17	46	63	0.69	11
White Ibis	0.47	2	1.42	14	13.07	518	534	7.94	2
TOTAL	29.21	277	14.53	482	42.13	1616	2375	**28.62**	
AVERAGE	2.92	27.7	1.45	40.17	3.24	134.67	158.33	**2.54**	

[1] Weighted Average by Observed Frequency

Table 24

Wading Birds and Pelicans

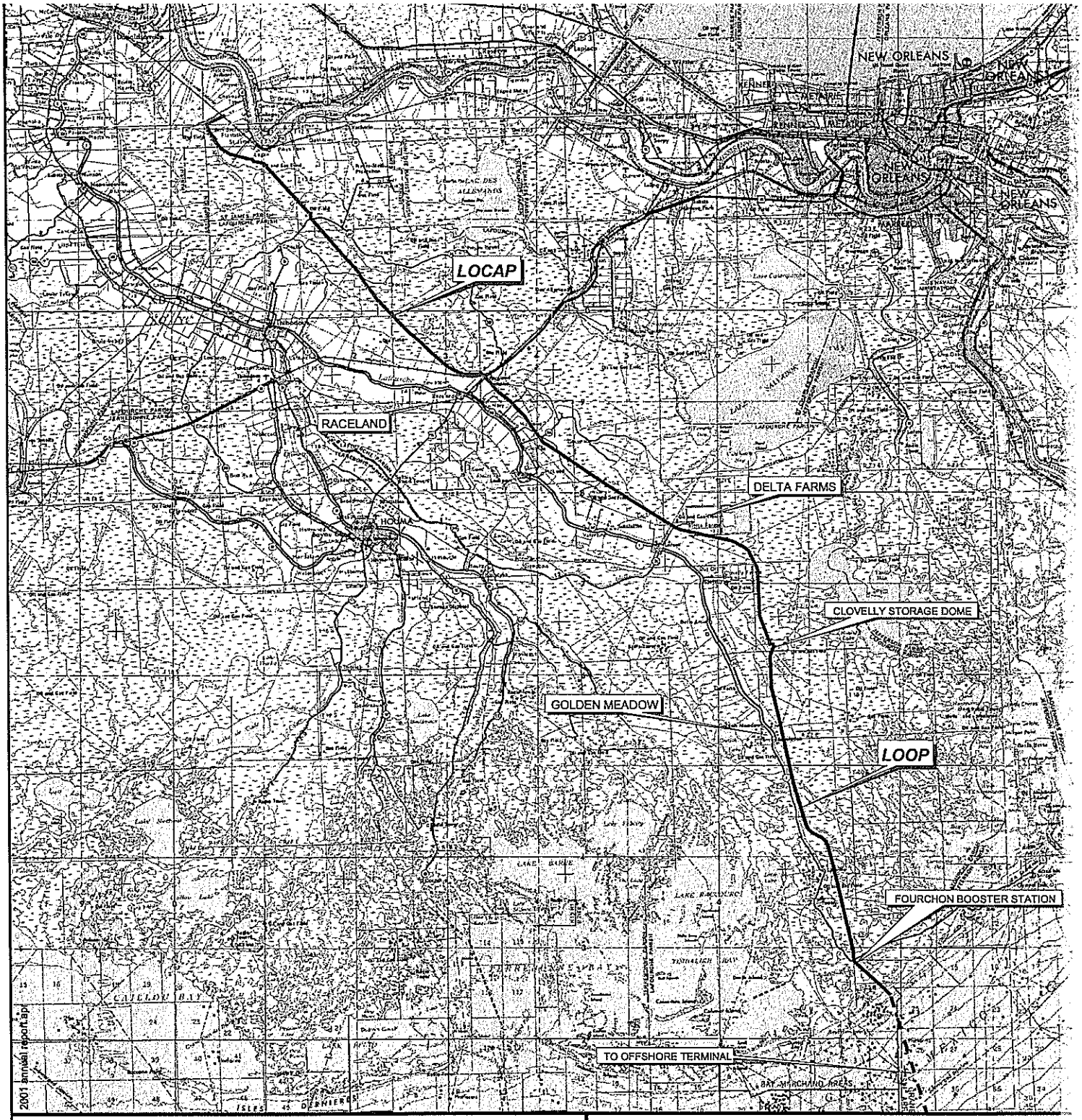
ANOVA Results for All Wading Bird November Surveys (1978 – 2001)

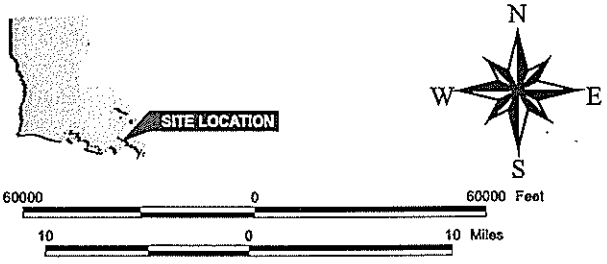
Independent Variable	Degrees of Freedom	Mean Square	F Value	Pr >F	Statistically Significant	Comments
Year	19	6463647	21.26	< 0.0001	Yes (>99%)	95 > 93 > 91
Marsh	2	14226381	46.80	< 0.0001	Yes (>99%)	F-I > B > S
Transect	4	1844704	6.07	< 0.0001	Yes (>99%)	WP > P > EC
Year X Transect	76	392929	1.29	0.0477	Yes (95%)	
Year X Marsh	38	999248	3.29	< 0.0001	Yes (>99%)	
Marsh X Transect	8	824743	2.71	0.0057	Yes (99%)	
Contrast						
Pipeline vs. Others	1	862131	2.84	0.0923	No	
Pipeline vs Controls	1	1059197	3.48	0.0621	No	
East vs West	1	2805765	9.23	0.0024	Yes (99%)	
Brackish vs Others	1	7325886	24.10	< 0.0001	Yes (>99%)	
Fresh-Intermediate vs Others	1	6236793	20.52	< 0.0001	Yes (>99%)	
Saline vs Others	1	30833321	101.44	< 0.0001	Yes (>99%)	
Construction vs Operation	1	20403721	67.13	< 0.0001	Yes (>99%)	
Disturbance	1	429	0.00	0.9700	No	
Model	147	1585530	5.22	< 0.0001	Yes (>99%)	$R^2 = 0.28$
Error	2018	303959				
Corr. Total	2165					

If Pr>F <0.0001 statistical significance of independent variable or contrast is >99%
If Pr>F =<0.0100 statistical significance of independent variable or contrast is at least 99%
If Pr>F =<0.0500 statistical significance of independent variable or contrast is at least 95%

Table 25
Wading Birds and Pelicans
Summary ANOVA Results Wading Bird Species November Surveys (1978 – 2001)

Species	Number of Records	Model Fit R^2	Significant Impact Weather	Significant Impact Marsh	Significant Impact Transect	Year	Highest Ranked Density Marsh	Highest Ranked Density Transect	Significant Contrast Disturbance	Significant Contrast Construction
American Anhinga	13	0.98	No	No	No	1982	B	EC	No	No
American White Pelican	176	0.34	Yes(>99%)	No	No	1995	B	EP	No	Yes(95%)
Black-crowned Night Heron	85	0.83	Yes(>99%)	No	Yes(99%)	1980	S	WP	No	No
Brown Pelican	20	0.82	No	No	No	1985	B	WC	N/C	N/C
Dark Ibis	105	0.75	Yes(>99%)	Yes(99%)	No	1985	F-I	WP	No	Yes(99%)
Double-crested Cormorant	169	0.40	Yes(99%)	Yes(99%)	Yes(99%)	2001	B	P	Yes(99%)	Yes(99%)
Great Blue Heron	285	0.36	Yes(99%)	Yes(>99%)	Yes(>99%)	1990	B	WP	No	Yes(>99%)
Great Egret	294	0.34	Yes(>99%)	Yes(>99%)	No	1995	F-I	EC	Yes(95%)	No
Green Heron	1	N/C	N/C	N/C	N/C	2001	F-I	EP	N/C	N/C
Green-backed Heron	18	0.67	No	No	No	2001	S	WP	No	No
Little Blue Heron	238	0.31	Yes(95%)	Yes(>99%)	Yes(99%)	1981	B	P	No	No
Roseate Spoonbill	3	N/C	N/C	N/C	N/C	2001	S	WC	N/C	N/C
Snowy Egret	270	0.20	Yes(95%)	Yes(>99%)	No	1995	F-I	P	No	No
Tricolored Heron	232	0.48	Yes(>99%)	Yes(>99%)	Yes(99%)	1995	B	P	No	Yes(99%)
White Ibis	176	0.49	Yes(>99%)	Yes(99%)	No	1994	F-I	WP	No	Yes(99%)
All Winter Wading Birds	2166	0.28	Yes(>99%)	Yes(>99%)	Yes(>99%)	1995	F-I	WP	No	Yes(>99%)
Most Frequent			Yes	Yes	No	1995	B	WP	No	Yes





Reference

U.S.G.S. 1:250 000 QUAD MAPS, BATON ROUGE, LA, NEW ORLEANS, LA, BRETON SOUND, LA. AND MOBILE, MS..

ESRI AUTHORIZED CONSULTANT

LOOP LLC

NEW ORLEANS, LOUISIANA

LOOP ENVIRONMENTAL MONITORING PROGRAM

SITE LOCATION MAP

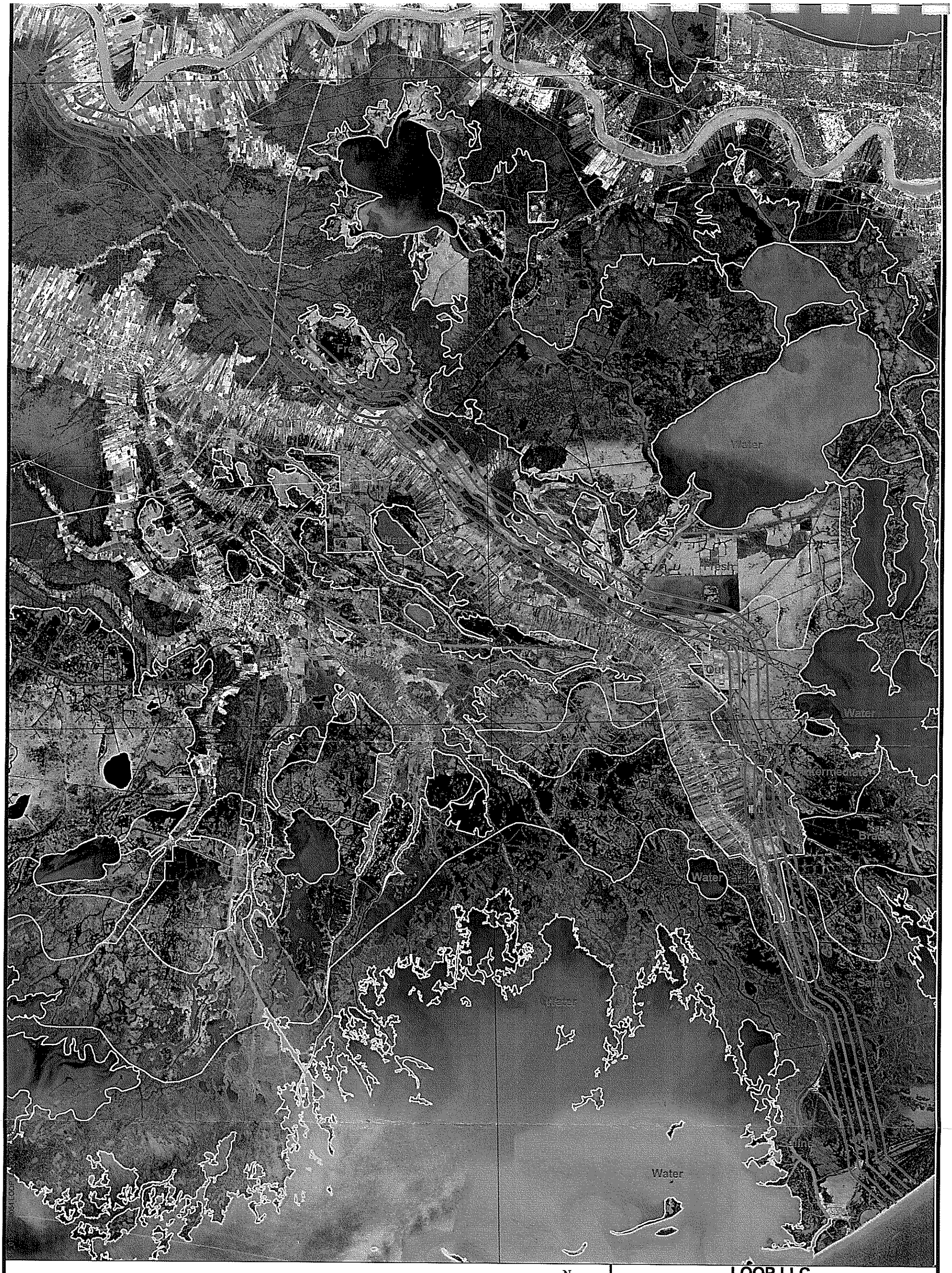
JEFFERSON PARISH

C-K ASSOCIATES, INC.

Baton Rouge, Louisiana

Drawn:	ABL/AV
Checked:	MMA
Approved:	DTL
Date:	09/23/2002
Dwg. No.:	A15-0054-26

FIGURE 1



LEGEND

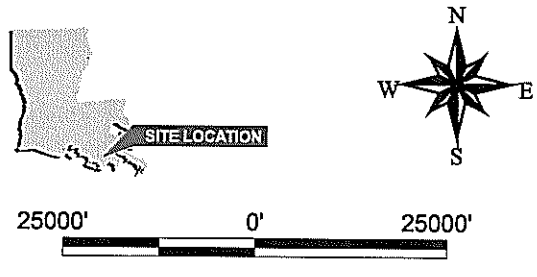
- Control Transects
- Sample Transects
- LOOP Pipeline Transect

Habitat Type

- Brackish
- Fresh
- Intermediate
- Out
- Saline
- Water

NOTES:

2000 SPOT Satellite Imagery



ESRI AUTHORIZED CONSULTANT

LOOP LLC

NEW ORLEANS, LOUISIANA

LOOP ENVIRONMENTAL MONITORING PROGRAM

MUSKRATS
LOCATION OF TRANSECTS

JEFFERSON, PARISH

C-K ASSOCIATES, INC.
BATON ROUGE, LOUISIANA

Drawn:	JDW
Checked:	DSC
Approved:	DJL
Date:	5/29/2002
Dwg. No.:	B15_0182_02

FIGURE 10

Appendix A
Beach Elevation
Elevation Data (in Centimeters) Collected from 1985 through 2001

Transect	Distance	11/85	8/86	1/87	11/87	5/88	11/88	5/89	3/90	10/91	6/92	9/92	5/93	12/93	4/94	12/94	5/95	11/95	12/97	10/00	1/01
W3	100	74.6	83.4	83.6	79.1	82.6	102.4	103.5	110.0	121.5	125.3	96.0	119.9	131.2	128.5	132.3	129.2	116.3	77	152	83.9
W3	125	107.0	97.6	95.9	100.6	101.5	118.5	115.7	144.2	114.8	109.4					20.1	13.6		8	101	
W3	150	115.5	107.2	109.6	115.4	121.1	123.6	29.4	133.8	5.7	-7.6										
W3	175	72.2	110.4	104.1		50.1	66.1	0.5	76.2												
W3	200	24.1	121.2	-20.7		-37.9	-23.6														
W3	225		-36.4	-39.9																	
W4	-25								34.1				36.4	38.5	40.1	37.8	35.9	39.8			
W4	0								33.5	33.2	38.4	37.2	36.4	38.8	39.8	37.8	37.7	39.5	20	33	45.4
W4	25					26.6	24.4	23.9	32.0	31.3	37.2	72.5	94.6	97.1	95.8	92.7	92.0	95.3	73	92	98.8
W4	50		18.4	19.6	24.1	51.6	70.8	70.1	74.2	82.5	86.9	112.5	105.9	105.6	105.3	106.4	104.2	119.7	118	112	117.1
W4	75	17.1	34.4	46.8	65.1	70.6	92.9	89.8	97.8	103.3	108.8	123.7	124.2	128.2	125.1	140.5	135.9	158.4		158	172.9
W4	100	91.3	83.4	76.8	79.6	91.6	108.4	108.5	112.5	125.2	140.2	78.3	109.6	100.1	128.2	106.7	111.5	101.7	86	121	55.8
W4	125	97.0	92.2	89.9	98.6	110.6	131.0	123.3	135.9	91.7	91.2	36.6				31.4	1.1			62	
W4	150	106.9	103.8	111.2	119.6	102.6	43.8	17.2		-3.1	-7.0										
W4	175	68.3	99.8	81.1		35.6	-32.0														
W4	200	-0.1	-21.6	-32.1		-40.4															
W4	225		-58.1	-58.9																	

Note:
Elevation is presented in centimeters NVGD

Appendix B
Beach Vegetation
Vegetation Data Collected in 2001

Transect	Scientific Name / Common Name / Distance	*Spartina patens* Salt Meadow Cordgrass	*Fimbristylis castanea* Salt Marsh Fimbristylis	*Uniolapaniculata* Southern Sea Oats	*Baccharis halimifolia* Groundsel Bush	*Phragmites australis* Common Reed	*Phragmites communis* Roseau Cane	*Distichlis spicata* Salt Grass	*Sesuvium portulacastrum* Sea-purslane	*Iva frutescens* Marsh Elder	*Andropogon glomeratus* Lowland Broom Sedge	*Solidago tenuifolia* Slender-leaved Goldenrod	*Solidago sempervirens* Seaside Goldenrod	*Salicornia virginica* Creeping Glasswort	*Hydrocotyle bonariensis* Coastal Plain Pennywort	*Phyla nodiflora* Common Frog-fruit	*Andropogon virginicus* Broom Sedge	*Spartina alterniflora* Smooth Cordgrass	*Euphorbia supina* Prostate Spurge	Percent Coverage of vegetation in plot.
W4	0	10%						15%												25%
W3	0	10%						40%												50%
W2	0	45%						25%												70%
W1	0							70%												70%
Pipeline	0							70%						10%						80%
E1	0							70%												70%
E2	0																			0%
E3	0																			0%
E4	0																			0%
E4	25																			0%
E3	25																			0%
E2	25	5%						64%	1%											70%
E1	25							49%	1%					10%						60%
Pipeline	0	30%			1%	5%		5%			15%	2%	2%		5%					65%
W1	25							50%								1%			10% US	50%
W2	25	25%						25%												50%
W3	25	40%			1%							2%	2%		10%				10% US	55%
W4	25	63%						2%				5%	10%		5%				40% US	85%
W4	50	20%				1%			1%				19%		19%					60%
W3	50	15%				15%							5%		5%					40%
W2	50	1%				4%		5%			15%	5%	5%		15%				30% US	50%
W1	50	60%						5%					5%		5%					75%
Pipeline	0	5%	10%								15%		5%		5%					40%
E1	50							59%	1%											60%
E2	50	45%												5%						50%
E3	50	50%																		50%
E4	50	10%						75%												85%
E4	75	50%																		50%
E3	75	70%			10%			10%							2%				15% US	92%
E2	75	50%			1%			14%		5%		5%	5%		5%			5%	15% US	100%

Appendix B
Beach Vegetation
Vegetation Data Collected in 2001

Transect	Scientific Name / Common Name / Distance	*Spartina patens* Salt Meadow Cordgrass	*Fimbristylis castanea* Salt Marsh Fimbristylis	*Uniolapaniculata* Southern Sea Oats	*Baccharis halimifolia* Groundsel Bush	*Phragmites australis* Common Reed	*Phragmites communis* Roseau Cane	*Distichlis spicata* Salt Grass	*Sesuvium portulacastrum* Sea-purslane	*Iva frutescens* Marsh Elder	*Andropogon glomeratus* Lowland Broom Sedge	*Solidago tenuifolia* Slender-leaved Goldenrod	*Solidago sempervirens* Seaside Goldenrod	*Salicornia virginica* Creeping Glasswort	*Hydrocotyle bonariensis* Coastal Plain Pennywort	*Phyla nodiflora* Common Frog-fruit	*Andropogon virginicus* Broom Sedge	*Spartina alterniflora* Smooth Cordgrass	*Euphorbia supina* Prostate Spurge	Percent Coverage of vegetation in plot.
E1	75	75%				1%		10%							5%					100%
Pipeline	0	5%				5%									1%		75%			85%
W1	75	45%				2.50%		2.50%					5%		5%					60%
W2	75	15%				15%									10%				5% US	40%
W3	75	15%				25%														40%
W4	75	30%				40%														70%
W4	100																			0%
W3	100																			0%
W2	100																			0%
W1	100																			0%
Pipeline	0			10%		10%												70%		90%
E1	100	30%				30%														60%
E2	100	15%				15%	69%								1					100%
E3	100	60%				15%	15%						<1%		10%					100%
E4	100	85%				10%							2.5%		2.5%				10% US	100%
E4	125																			0%
E3	125																			0%
E2	125																			0%
E1	125																			0%
Pipeline	0																			0%
W1	125																			0%
W2	125																			0%
W3	125																			0%
W4	125																			0%

US = Understory

Appendix C
General Biological Overflight
Vegetation and Wildlife Data
Collected in 2001

Section 1 - Intracoastal Waterway to North Clovelly Canal

	Marsh Vegetation	Condition	
Pipeline Row:	75% vegetated	Brown	
Adjacent Marsh:	80% vegetated	Brown	
Wildlife Observed:			
Common Name	Scientific Name	Present	Number
Great Egret	*Casmerodius albus*		
Snowy Egret	*Egretta thula*	X	3
Cattle Egret	*Bubulcus ibis*		
White Ibis	*Eudocimus albus*		
Dark Ibis	*Plegadis falcinellus*		
Tricolor Heron	*Egretta tricolor*		
Great Blue Heron	*Ardea herodias*		
Little Blue Heron	*Egretta caerulea*		
Black Crowned Night Heron	*Nycticorax nycticorax*		
White Pelican	*Pelecanus erythrorhynchos*		
Brown Pelican	*Pelecanus occidentalis*	X	5
Roseate Spoonbill	*Ajaia ajaja*		
Double-crested Cormorant	*Phalacrocorax auritus*	X	26
American Coot	*Fulica americana*	X	150
Scaup	*Aythya affinis*	X	50
Pied-billed Grebe	*Podilymbus podiceps*		
Gadwall	*Anus strepera*		
Blue-winged Teal	*Anas discors*	X	7
Green-winged Teal	*Anas crecca*		
Mottled Duck	*Anas fulvigula*		
Mallard Duck	*Anas platyrhynchos*		
Spoon-billed Duck	*Anas clypeata*	X	2
Red-tailed Hawk	*Buteo jamaicensis*		
American Crow	*Corvus brachyrhynchos*	X	1
American Gold Finch	*Carduelis tristis*	X	5
House Wren	*Troglodytes aedon*	X	5
Merganser	*Mergus merganser*		
Rail	*Rallus sp.*	X	6
Red-winged Blackbird	*Agelaius phoeniceus*	X	5
Laughing Gull	*Larus atricilla*	X	2
Snipe	*Galinago galinago*	X	10
Tern	*Sterna hirundo*		
Turkey Vulture	*Cathartes aura*	X	4
White-tailed Deer	*Odocoileus virginianus*		
Muskrat	*Ondatra Zibethicus*		
Nutria	*Myocastor coypus*		
American Alligator	*Alligator mississippiensis*	X	2

Appendix C
General Biological Overflight
Vegetation and Wildlife Data
Collected in 2001

Section 2 - North Clovelly Canal to LOOP Galliano Storage Facility

	Marsh Vegetation	Condition	
Pipeline Row:	65% vegetated	Brown	
Adjacent Marsh:	80% vegetated	Brown	
Wildlife Observed:			
Common Name	Scientific Name	Present	Number
Great Egret	*Casmerodius albus*		
Snowy Egret	*Egretta thula*	X	22
Cattle Egret	*Bubulcus ibis*		
White Ibis	*Eudocimus albus*		
Dark Ibis	*Plegadis falcinellus*		
Tricolor Heron	*Egretta tricolor*		
Great Blue Heron	*Ardea herodias*	X	7
Little Blue Heron	*Egretta caerulea*		
Black Crowned Night Heron	*Nycticorax nycticorax*		
White Pelican	*Pelecanus erythrorhynchos*	X	1
Brown Pelican	*Pelecanus occidentalis*	X	1
Roseate Spoonbill	*Ajaia ajaja*		
Double-crested Cormorant	*Phalacrocorax auritus*	X	6
American Coot	*Fulica americana*		
Scaup	*Aythya affinis*	X	6
Pied-billed Grebe	*Podilymbus podiceps*		
Gadwall	*Anus strepera*		
Blue-winged Teal	*Anas discors*	X	16
Green-winged Teal	*Anas crecca*		
Mottled Duck	*Anas fulvigula*		
Mallard Duck	*Anas platyrhynchos*		
Spoon-billed Duck	*Anas clypeata* .	X	9
Red-tailed Hawk	*Buteo jamaicensis*		
American Crow	*Corvus brachyrhynchos*		
American Gold Finch	*Carduelis tristis*		
House Wren	*Troglodytes aedon*		
Merganser	*Mergus merganser*	X	2
Rail	*Rallus sp.*	X	2
Red-winged Blackbird	*Agelaius phoeniceus*	X	4
Laughing Gull	*Larus atricilla*	X	19
Snipe	*Galinago galinago*	X	14
Tern	*Sterna hirundo*	X	37
Turkey Vulture	*Cathartes aura*		
White-tailed Deer	*Odocoileus virginianus*		
Muskrat	*Ondatra Zibethicus*		
Nutria	*Myocastor coypus*		
American Alligator	*Alligator mississippiensis*		

Appendix C
General Biological Overflight
Vegetation and Wildlife Data
Collected in 2001

Section 3 - LOOP Galliano Storage Facility to Yankee Canal

	Marsh Vegetation	Condition	
Pipeline Row:	45% vegetated	Brown	
Adjacent Marsh:	55% vegetated	Brown	
Wildlife Observed:			
Common Name	Scientific Name	Present	Number
Great Egret	*Casmerodius albus*		
Snowy Egret	*Egretta thula*	X	10
Cattle Egret	*Bubulcus ibis*		
White Ibis	*Eudocimus albus*		
Dark Ibis	*Plegadis falcinellus*		
Tricolor Heron	*Egretta tricolor*		
Great Blue Heron	*Ardea herodias*	X	4
Little Blue Heron	*Egretta caerulea*		
Black Crowned Night Heron	*Nycticorax nycticorax*		
White Pelican	*Pelecanus erythrorhynchos*		
Brown Pelican	*Pelecanus occidentalis*		
Roseate Spoonbill	*Ajaia ajaja*		
Double-crested Cormorant	*Phalacrocorax auritus*	X	6
American Coot	*Fulica americana*		
Scaup	*Aythya affinis*		
Pied-billed Grebe	*Podilymbus podiceps*		
Gadwall	*Anus strepera*		
Blue-winged Teal	*Anas discors*	X	1
Green-winged Teal	*Anas crecca*		
Mottled Duck	*Anas fulvigula*		
Mallard Duck	*Anas platyrhynchos*		
Spoon-billed Duck	*Anas clypeata*		
Red-tailed Hawk	*Buteo jamaicensis*		
American Crow	*Corvus brachyrhynchos*	X	4
American Gold Finch	*Carduelis tristis*		
House Wren	*Troglodytes aedon*		
Merganser	*Mergus merganser*		
Rail	*Rallus sp.*		
Red-winged Blackbird	*Agelaius phoeniceus*		
Laughing Gull	*Larus atricilla*	X	1
Snipe	*Galinago galinago*		
Tern	*Sterna hirundo*		
Turkey Vulture	*Cathartes aura*		
White-tailed Deer	*Odocoileus virginianus*		
Muskrat	*Ondatra Zibethicus*		
Nutria	*Myocastor coypus*		
American Alligator	*Alligator mississippiensis*		

Appendix C
General Biological Overflight
Vegetation and Wildlife Data
Collected in 2001

Section 4 - Yankee Canal to Tidewater Canal

	Marsh Vegetation	Condition	
Pipeline Row:	40% vegetated	Brown	
Adjacent Marsh:	50% vegetated	Brown	
Wildlife Observed:			
Common Name	Scientific Name	Present	Number
Great Egret	*Casmerodius albus*		
Snowy Egret	*Egretta thula*	X	23
Cattle Egret	*Bubulcus ibis*	X	1
White Ibis	*Eudocimus albus*	x	6
Dark Ibis	*Plegadis falcinellus*		
Tricolor Heron	*Egretta tricolor*		
Great Blue Heron	*Ardea herodias*	X	11
Little Blue Heron	*Egretta caerulea*		
Black Crowned Night Heron	*Nycticorax nycticorax*		
White Pelican	*Pelecanus erythrorhynchos*	X	3
Brown Pelican	*Pelecanus occidentalis*	X	6
Roseate Spoonbill	*Ajaia ajaja*		
Double-crested Cormorant	*Phalacrocorax auritus*	X	43
American Coot	*Fulica americana*		
Scaup	*Aythya affinis*	X	5
Pied-billed Grebe	*Podilymbus podiceps*		
Gadwall	*Anus strepera*		
Blue-winged Teal	*Anas discors*	X	
Green-winged Teal	*Anas crecca*		
Mottled Duck	*Anas fulvigula*		
Mallard Duck	*Anas platyrhynchos*	X	40
Spoon-billed Duck	*Anas clypeata*	X	8
Red-tailed Hawk	*Buteo jamaicensis*		
American Crow	*Corvus brachyrhynchos*		
American Gold Finch	*Carduelis tristis*		
House Wren	*Troglodytes aedon*		
Merganser	*Mergus merganser*		
Rail	*Rallus sp.*		
Red-winged Blackbird	*Agelaius phoeniceus*	X	8
Laughing Gull	*Larus atricilla*		
Snipe	*Galinago galinago*		
Tern	*Sterna hirundo*		
Turkey Vulture	*Cathartes aura*		
White-tailed Deer	*Odocoileus virginianus*		
Muskrat	*Ondatra Zibethicus*		
Nutria	*Myocastor coypus*		
American Alligator	*Alligator mississippiensis*		

Appendix C
General Biological Overflight
Vegetation and Wildlife Data
Collected in 2001

Section 5 - Tidewater Canal to Southwest Louisiana Canal

	Marsh Vegetation	Condition	
Pipeline Row:	40-45% vegetated	Brown	
Adjacent Marsh:	45-50% vegetated	Brown	
Wildlife Observed: Common Name	Scientific Name	Present	Number
Great Egret	*Casmerodius albus*		
Snowy Egret	*Egretta thula*	X	9
Cattle Egret	*Bubulcus ibis*		
White Ibis	*Eudocimus albus*	X	2
Dark Ibis	*Plegadis falcinellus*		
Tricolor Heron	*Egretta tricolor*		
Great Blue Heron	*Ardea herodias*	X	3
Little Blue Heron	*Egretta caerulea*		
Black Crowned Night Heron	*Nycticorax nycticorax*		
White Pelican	*Pelecanus erythrorhynchos*	X	2
Brown Pelican	*Pelecanus occidentalis*	X	4
Roseate Spoonbill	*Ajaia ajaja*		
Double-crested Cormorant	*Phalacrocorax auritus*	X	10
American Coot	*Fulica americana*		
Scaup	*Aythya affinis*		
Pied-billed Grebe	*Podilymbus podiceps*		
Gadwall	*Anus strepera*		
Blue-winged Teal	*Anas discors*	X	19
Green-winged Teal	*Anas crecca*		
Mottled Duck	*Anas fulvigula*		
Mallard Duck	*Anas platyrhynchos*	X	3
Spoon-billed Duck	*Anas clypeata*	X	6
Red-tailed Hawk	*Buteo jamaicensis*		
American Crow	*Corvus brachyrhynchos*		
American Gold Finch	*Carduelis tristis*		
House Wren	*Troglodytes aedon*		
Merganser	*Mergus merganser*		
Rail	*Rallus sp.*		
Red-winged Blackbird	*Agelaius phoeniceus*	X	5
Laughing Gull	*Larus atricilla*	X	7
Snipe	*Galinago galinago*	X	8
Tern	*Sterna hirundo*		
Turkey Vulture	*Cathartes aura*		
White-tailed Deer	*Odocoileus virginianus*		
Muskrat	*Ondatra Zibethicus*		
Nutria	*Myocastor coypus*		
American Alligator	*Alligator mississippiensis*		

Appendix C
General Biological Overflight
Vegetation and Wildlife Data
Collected in 2001

Section 6 - Southwest Louisiana Canal to LA Highway 1

	Marsh Vegetation	Condition	
Pipeline Row:	65% vegetated	Brown	
Adjacent Marsh:	80% vegetated	Brown	
Wildlife Observed:			
Common Name	Scientific Name	Present	Number
Great Egret	*Casmerodius albus*	X	6
Snowy Egret	*Egretta thula*	X	2
Cattle Egret	*Bubulcus ibis*		
White Ibis	*Eudocimus albus*		
Dark Ibis	*Plegadis falcinellus*		
Tricolor Heron	*Egretta tricolor*		
Great Blue Heron	*Ardea herodias*		
Little Blue Heron	*Egretta caerulea*		
Black Crowned Night Heron	*Nycticorax nycticorax*		
White Pelican	*Pelecanus erythrorhynchos*	X	15
Brown Pelican	*Pelecanus occidentalis*	X	17
Roseate Spoonbill	*Ajaia ajaja*		
Double-crested Cormorant	*Phalacrocorax auritus*	X	48
American Coot	*Fulica americana*		
Scaup	*Aythya affinis*	X	13
Pied-billed Grebe	*Podilymbus podiceps*	X	4
Gadwall	*Anus strepera*		
Blue-winged Teal	*Anas discors*	X	7
Green-winged Teal	*Anas crecca*		4
Mottled Duck	*Anas fulvigula*		
Mallard Duck	*Anas platyrhynchos*		
Spoon-billed Duck	*Anas clypeata*		
Red-tailed Hawk	*Buteo jamaicensis*		
American Crow	*Corvus brachyrhynchos*		
American Gold Finch	*Carduelis tristis*		
House Wren	*Troglodytes aedon*		
Merganser	*Mergus merganser*		
Rail	*Rallus sp.*	X	5
Red-winged Blackbird	*Agelaius phoeniceus*		
Laughing Gull	*Larus atricilla*	X	2
Snipe	*Galinago galinago*	X	26
Tern	*Sterna hirundo*		
Turkey Vulture	*Cathartes aura*		
White-tailed Deer	*Odocoileus virginianus*		
Muskrat	*Ondatra Zibethicus*		
Nutria	*Myocastor coypus*		
American Alligator	*Alligator mississippiensis*		

Appendix C
General Biological Overflight
Vegetation and Wildlife Data
Collected in 2001

Section 7 - LA Highway 1 to Beach

	Marsh Vegetation	Condition
Pipeline Row:	10% vegetated	Brown
Adjacent Marsh:	40% vegetated	Brown

Wildlife Observed: Common Name	Scientific Name	Present	Number
Great Egret	*Casmerodius albus*		
Snowy Egret	*Egretta thula*	X	7
Cattle Egret	*Bubulcus ibis*		
White Ibis	*Eudocimus albus*	X	13
Dark Ibis	*Plegadis falcinellus*		
Tricolor Heron	*Egretta tricolor*		
Great Blue Heron	*Ardea herodias*	X	1
Little Blue Heron	*Egretta caerulea*	X	1
Black Crowned Night Heron	*Nycticorax nycticorax*		
White Pelican	*Pelecanus erythrorhynchos*		
Brown Pelican	*Pelecanus occidentalis*	X	2
Roseate Spoonbill	*Ajaia ajaja*	X	8
Double-crested Cormorant	*Phalacrocorax auritus*	X	6
American Coot	*Fulica americana*	X	8
Scaup	*Aythya affinis*	X	20
Pied-billed Grebe	*Podilymbus podiceps*		
Gadwall	*Anus strepera*		
Blue-winged Teal	*Anas discors*		
Green-winged Teal	*Anas crecca*		
Mottled Duck	*Anas fulvigula*		
Mallard Duck	*Anas platyrhynchos*		
Spoon-billed Duck	*Anas clypeata*		
Red-tailed Hawk	*Buteo jamaicensis*		
American Crow	*Corvus brachyrhynchos*	X	2
American Gold Finch	*Carduelis tristis*		
House Wren	*Troglodytes aedon*		
Merganser	*Mergus merganser*		
Rail	*Rallus sp.*		
Red-winged Blackbird	*Agelaius phoeniceus*		
Laughing Gull	*Larus atricilla*	X	9
Snipe	*Galinago galinago*		
Tern	*Sterna hirundo*		
Turkey Vulture	*Cathartes aura*		
White-tailed Deer	*Odocoileus virginianus*		
Muskrat	*Ondatra Zibethicus*		
Nutria	*Myocastor coypus*		
American Alligator	*Alligator mississippiensis*		

Appendix D
General Biological Overflight
Location and Condition of Plugs in 2001

Segment #	Plug #	Lat/Long Coordinates	Condition	Comment
1	1	90 20 59 / 29 35 06	Good	Low in spots
1	2	90 20 09 / 29 34 56	Excellent	
1	3	90 19 01 / 29 34 41	Good	
1	4	90 18 55 / 29 34 40	Good	
1	5	90 18 39 / 29 34 37	Fail	Needs work
1	6	90 18 37 / 29 34 36	Fail	Needs work
1	7	90 17 59 / 29 34 28	Average	
1	8	90 17 57 / 29 34 28	Average	
1	9	90 17 49 / 29 34 25	Average	
1	10	90 17 48 / 29 34 25	Fail	Needs work
2	11	90 16 41 / 29 33 39	Average	Low in spots
2	12	90 16 40 / 29 33 37	Good	
2	13	90 16 30 / 29 33 22	Good	Low in spots
2	14	90 16 29 / 29 33 19	Average	Heavy vegetation
2	15	90 16 26 / 29 33 13	Excellent	
2	16	90 16 25 / 29 33 11	Excellent	
2	17	90 16 21 / 29 32 25	Good	
2	18	90 16 21 / 29 32 22	Good	Water goes around
2	19	90 16 18 / 29 30 26	Excellent	Water goes around
2	20	90 16 18 / 29 30 17	Poor	
3	21	90 15 60 / 29 29 24	Excellent	
3	22	90 15 59 / 29 29 21	Good	
3	23	90 15 42 / 29 28 36	Excellent	
3	24	90 15 42 / 29 28 33	Excellent	
4	25	90 15 39 / 29 28 24	Excellent	
5	26	90 15 35 / 29 28 24	Excellent	
5	27	90 15 21 / 29 28 23	Excellent	
5	28	90 15 03 / 29 23 28	Excellent	
5	29	90 15 02 / 29 23 26	Excellent	
5	30	90 14 19 / 29 20 08	Excellent	
5	31	90 14 18 / 29 20 05	Excellent	
5	32	90 14 11 / 29 19 44	Excellent	
5	33	90 14 10 / 29 19 42	Good	
5	34	90 14 10 / 29 19 40	Excellent	
6	35	90 13 31 / 29 17 37	Excellent	
6	36	90 13 30 / 29 17 35	Excellent	

Appendix D
General Biological Overflight
Location and Condition of Plugs in 2001

Segment #	Plug #	Lat/Long Coordinates	Condition	Comment
6	37	90 12 06 / 29 16 21	Excellent	
6	38	90 11 58 / 29 15 55	Excellent	
6	39	90 11 57 / 29 15 51	Excellent	
6	40	90 11 55 / 29 15 44	Excellent	Has vegetation
6	41	90 11 54 / 29 15 41	Fail	Needs work (non-existant)
6	42	90 11 50 / 29 15 26	Good	Water goes around
6	43	90 11 44 / 29 15 07	Fail	Water goes around & needs work
6	44	90 11 43 / 29 15 03	Good	Water goes around
6	45	90 11 42 / 29 14 60	Excellent	
6	46	90 11 28 / 29 13 57	Fail	Needs work (needs to be built up)
6	47	90 11 27 / 29 13 55	Fail	Needs work (almost non-existant)
6	48	90 11 23 / 29 13 41	Fail	Needs work (almost non-existant)
6	49	90 11 23 / 29 13 38	Fail	Needs work low
6	50	90 11 16 / 29 13 07	Average	
7	51	90 11 16 / 29 13 05	Average	
7	52	90 09 29 / 29 08 29	Excellent	
7	53	90 09 21 / 29 08 22	Excellent	Heavy vegetation
7	54	90 08 58 / 29 08 03	Excellent	
7	55	90 08 56 / 29 08 01	Excellent	
7	56	90 08 53 / 29 07 58	Good	Heavy vegetation
7	57	90 08 51 / 29 07 57	Excellent	
7	58	90 08 43 / 29 07 50	Good	Water goes around & needs work
7	59	90 08 41 / 29 07 48	Poor	

Appendix E
Wading Bird/Seabird Rookeries
Number of Birds and Rookeries Observed in 2001

Rookery ID	Common Name	Scientific Name	Number
1-001	Great Blue Heron	*Ardea herodias*	25
	American Anhinga	*Anhinga anhinga*	45
	Great Egret	*Casmerodius albus*	225
	Total		**295**
1-002	Little Blue Heron	*Egretta caerulea*	5
	Great Blue Heron	*Ardea herodias*	6
	American Anhinga	*Anhinga anhinga*	15
	Great Egret	*Casmerodius albus*	220
	Total		**246**
1-003	Great Egret	*Casmerodius albus*	90
	Total		**90**
2-001	White Ibis	*Eudocimus albus*	2,554
	Total		**2,554**
2-002	White Ibis	*Eudocimus albus*	3,013
	Total		**3,013**
2-003	White Ibis	*Eudocimus albus*	10
	Snowy Egret	*Egretta thula*	27
	Little Blue Heron	*Egretta caerulea*	28
	Tricolored Heron	*Egretta tricolor*	55
	Dark Ibis	*Plegadis falcinellus*	135
	Cattle Egret	*Bubulcus ibis*	342
	Total		**597**
2-004	Dark Ibis	*Plegadis falcinellus*	40
	Little Blue Heron	*Egretta caerulea*	120
	Cattle Egret	*Bubulcus ibis*	155
	White Ibis	*Eudocimus albus*	195
	Snowy Egret	*Egretta thula*	259
	Total		**769**
2-005	Cattle Egret	*Bubulcus ibis*	100
	Little Blue Heron	*Egretta caerulea*	300
	Snowy Egret	*Egretta thula*	400
	Total		**800**
2-006	Tricolored Heron	*Egretta tricolor*	50
	Snowy Egret	*Egretta thula*	60
	Little Blue Heron	*Egretta caerulea*	350
	Total		**460**

Appendix E
Wading Bird/Seabird Rookeries
Number of Birds and Rookeries Observed in 2001

Rookery ID	Common Name	Scientific Name	Number
3-001	Great Blue Heron	*Ardea herodias*	1
	Yellow-crowned Night Heron	*Nyctanassa violacea*	1
	American Anhinga	*Anhinga anhinga*	30
	Great Egret	*Casmerodius albus*	62
	Total		**94**
3-002	Snowy Egret	*Egretta thula*	3
	Little Blue Heron	*Egretta caerulea*	24
	Total		**27**
3-003	Snowy Egret	*Egretta thula*	96
	Tricolored Heron	*Egretta tricolor*	104
	Little Blue Heron	*Egretta caerulea*	169
	Dark Ibis	*Plegadis falcinellus*	483
	Cattle Egret	*Bubulcus ibis*	509
	Total		**1,361**
3-004	Dark Ibis	*Plegadis falcinellus*	312
	Total		**312**
3-005	Roseate Spoonbill	*Ajaia ajaja*	8
	Tricolored Heron	*Egretta tricolor*	44
	Little Blue Heron	*Egretta caerulea*	150
	Snowy Egret	*Egretta thula*	190
	Cattle Egret	*Bubulcus ibis*	212
	Total		**604**
3-006	Dark Ibis	*Plegadis falcinellus*	56
	Total		**56**
3-007	Little Blue Heron	*Egretta caerulea*	3
	American Anhinga	*Anhinga anhinga*	8
	Dark Ibis	*Plegadis falcinellus*	243
	Total		**254**
3-008	Dark Ibis	*Plegadis falcinellus*	358
	Total		**358**
5-001	Great Egret	*Casmerodius albus*	15
	Great Blue Heron	*Ardea herodias*	18
	Total		**33**
5-002	Little Blue Heron	*Egretta caerulea*	1
	Snowy Egret	*Egretta thula*	2
	Great Blue Heron	*Ardea herodias*	50
	Great Egret	*Casmerodius albus*	81
	Total		**134**

Appendix E
Wading Bird/Seabird Rookeries
Number of Birds and Rookeries Observed in 2001

Rookery ID	Common Name	Scientific Name	Number
5-003	Black-crowned Night Heron	*Nycticorax nycticorax*	4
	White Ibis	*Eudocimus albus*	4
	Tricolored Heron	*Egretta tricolor*	50
	Dark Ibis	*Plegadis falcinellus*	421
	Cattle Egret	*Bubulcus ibis*	450
	Little Blue Heron	*Egretta caerulea*	538
	Snowy Egret	*Egretta thula*	545
	Total		**2,012**
5-004	Dark Ibis	*Plegadis falcinellus*	35
	Roseate Spoonbill	*Ajaia ajaja*	115
	Little Blue Heron	*Egretta caerulea*	150
	Cattle Egret	*Bubulcus ibis*	200
	Snowy Egret	*Egretta thula*	200
	Total		**700**
5-005	Black-crowned Night Heron	*Nycticorax nycticorax*	2
	Dark Ibis	*Plegadis falcinellus*	44
	Tricolored Heron	*Egretta tricolor*	66
	Roseate Spoonbill	*Ajaia ajaja*	98
	Little Blue Heron	*Egretta caerulea*	250
	Cattle Egret	*Bubulcus ibis*	266
	Snowy Egret	*Egretta thula*	363
	Total		**1,089**
5-006	Great Blue Heron	*Ardea herodias*	12
	American Anhinga	*Anhinga anhinga*	59
	Great Egret	*Casmerodius albus*	278
	Total		**349**
5-007	Snowy Egret	*Egretta thula*	30
	White Ibis	*Eudocimus albus*	9,972
	Total		**10,002**
5-008	Black-crowned Night Heron	*Nycticorax nycticorax*	2
	Yellow-crowned Night Heron	*Nyctanassa violacea*	2
	Little Blue Heron	*Egretta caerulea*	35
	White Ibis	*Eudocimus albus*	546
	Total		**585**
5-009	Black-crowned Night Heron	*Nycticorax nycticorax*	2
	American Anhinga	*Anhinga anhinga*	4
	Little Blue Heron	*Egretta caerulea*	10
	Tricolored Heron	*Egretta tricolor*	10
	Great Blue Heron	*Ardea herodias*	20
	Great Egret	*Casmerodius albus*	170
	Total		**216**

Appendix E
Wading Bird/Seabird Rookeries
Number of Birds and Rookeries Observed in 2001

Rookery ID	Common Name	Scientific Name	Number
5-010	Tricolored Heron	*Egretta tricolor*	5
	White Ibis	*Eudocimus albus*	10
	Snowy Egret	*Egretta thula*	20
	Cattle Egret	*Bubulcus ibis*	280
	Dark Ibis	*Plegadis falcinellus*	300
	Total		**615**
6-001	Tricolored Heron	*Egretta tricolor*	65
	Cattle Egret	*Bubulcus ibis*	250
	Little Blue Heron	*Egretta caerulea*	355
	Snowy Egret	*Egretta thula*	355
	White Ibis	*Eudocimus albus*	3,516
	Total		**4,541**
6-002	White Ibis	*Eudocimus albus*	120
	Total		**120**
6-003	Tricolored Heron	*Egretta tricolor*	100
	Snowy Egret	*Egretta thula*	124
	Cattle Egret	*Bubulcus ibis*	180
	Little Blue Heron	*Egretta caerulea*	186
	Dark Ibis	*Plegadis falcinellus*	386
	Total		**976**
6-004	Tricolored Heron	*Egretta tricolor*	30
	Dark Ibis	*Plegadis falcinellus*	60
	Little Blue Heron	*Egretta caerulea*	180
	Snowy Egret	*Egretta thula*	180
	Total		**450**
6-005	Snowy Egret	*Egretta thula*	2
	Tricolored Heron	*Egretta tricolor*	4
	Cattle Egret	*Bubulcus ibis*	10
	Great Egret	*Casmerodius albus*	11
	Little Blue Heron	*Egretta caerulea*	12
	Total		**39**
6-006	Snowy Egret	*Egretta thula*	80
	Tricolored Heron	*Egretta tricolor*	110
	Little Blue Heron	*Egretta caerulea*	200
	Cattle Egret	*Bubulcus ibis*	880
	Total		**1,270**
6-007	Snowy Egret	*Egretta thula*	340
	Tricolored Heron	*Egretta tricolor*	340
	Little Blue Heron	*Egretta caerulea*	700
	Cattle Egret	*Bubulcus ibis*	1,285
	Total		**2,665**

Appendix E
Wading Bird/Seabird Rookeries
Number of Birds and Rookeries Observed in 2001

Rookery ID	Common Name	Scientific Name	Number
7-001	Dark Ibis	*Plegadis falcinellus*	56
	Total		**56**
7-002	White Ibis	*Eudocimus albus*	2
	Great Egret	*Casmerodius albus*	8
	Tricolored Heron	*Egretta tricolor*	21
	Little Blue Heron	*Egretta caerulea*	50
	Cattle Egret	*Bubulcus ibis*	100
	Dark Ibis	*Plegadis falcinellus*	163
	Snowy Egret	*Egretta thula*	239
	Total		**583**
7-003	Black-crowned Night Heron	*Nycticorax nycticorax*	2
	Great Egret	*Casmerodius albus*	2
	Tricolored Heron	*Egretta tricolor*	17
	Dark Ibis	*Plegadis falcinellus*	29
	Cattle Egret	*Bubulcus ibis*	61
	Little Blue Heron	*Egretta caerulea*	166
	White Ibis	*Eudocimus albus*	427
	Snowy Egret	*Egretta thula*	691
	Total		**1,395**
7-004	Cattle Egret	*Bubulcus ibis*	75
	Dark Ibis	*Plegadis falcinellus*	75
	Snowy Egret	*Egretta thula*	150
	Little Blue Heron	*Egretta caerulea*	216
	Total		**516**
10-001	Snowy Egret	*Egretta thula*	340
	Dark Ibis	*Plegadis falcinellus*	652
	Total		**992**
10-002	American Anhinga	*Anhinga anhinga*	4
	Great Blue Heron	*Ardea herodias*	11
	Great Egret	*Casmerodius albus*	62
	Total		77
10-003	Black-crowned Night Heron	*Nycticorax nycticorax*	25
	Dark Ibis	*Plegadis falcinellus*	50
	Tricolored Heron	*Egretta tricolor*	100
	Cattle Egret	*Bubulcus ibis*	150
	Little Blue Heron	*Egretta caerulea*	150
	Snowy Egret	*Egretta thula*	150
	Total		**625**
10-004	Great Egret	*Casmerodius albus*	26
	Total		**26**

Appendix E
Wading Bird/Seabird Rookeries
Number of Birds and Rookeries Observed in 2001

Rookery ID	Common Name	Scientific Name	Number
10-005	Dark Ibis	*Plegadis falcinellus*	10
	Tricolored Heron	*Egretta tricolor*	25
	Little Blue Heron	*Egretta caerulea*	150
	Snowy Egret	*Egretta thula*	150
	Total		**335**
10-006	White Ibis	*Eudocimus albus*	1,325
	Total		**1,325**
10-007	Cattle Egret	*Bubulcus ibis*	22
	Tricolored Heron	*Egretta tricolor*	30
	Little Blue Heron	*Egretta caerulea*	39
	Snowy Egret	*Egretta thula*	47
	Dark Ibis	*Plegadis falcinellus*	142
	Total		**280**
10-008	White Ibis	*Eudocimus albus*	30
	Tricolored Heron	*Egretta tricolor*	60
	Dark Ibis	*Plegadis falcinellus*	100
	Little Blue Heron	*Egretta caerulea*	100
	Cattle Egret	*Bubulcus ibis*	200
	Snowy Egret	*Egretta thula*	492
	Total		**982**
10-009	Black-crowned Night Heron	*Nycticorax nycticorax*	1
	Snowy Egret	*Egretta thula*	7
	Cattle Egret	*Bubulcus ibis*	8
	Great Egret	*Casmerodius albus*	34
	Little Blue Heron	*Egretta caerulea*	86
	Total		**136**
10-010	Yellow-crowned Night Heron	*Nyctanassa violacea*	1
	Tricolored Heron	*Egretta tricolor*	2
	Snowy Egret	*Egretta thula*	6
	Little Blue Heron	*Egretta caerulea*	162
	Total		**171**
10-011	Great Blue Heron	*Ardea herodias*	17
	Great Egret	*Casmerodius albus*	71
	Total		**88**
11-001	Great Egret	*Casmerodius albus*	30
	Snowy Egret	*Egretta thula*	50
	Cattle Egret	*Bubulcus ibis*	161
	Total		**241**
12-001	Snowy Egret	*Egretta thula*	2
	Tricolored Heron	*Egretta tricolor*	2
	Black-crowned Night Heron	*Nycticorax nycticorax*	7
	Little Blue Heron	*Egretta caerulea*	67
	Total		**78**

Appendix E
Wading Bird/Seabird Rookeries
Number of Birds and Rookeries Observed in 2001

Rookery ID	Common Name	Scientific Name	Number
12-002	Snowy Egret	*Egretta thula*	15
	Great Egret	*Casmerodius albus*	26
	Little Blue Heron	*Egretta caerulea*	27
	Total		**68**
12-003	Great Blue Heron	*Ardea herodias*	32
	Total		**32**
13-001	Cattle Egret	*Bubulcus ibis*	220
	Total		**220**
14-001	Little Blue Heron	*Egretta caerulea*	57
	Tricolored Heron	*Egretta tricolor*	185
	Snowy Egret	*Egretta thula*	240
	Laughing Gull	*Larus atricilla*	350
	Total		**832**
14-002	Roseate Spoonbill	*Ajaia ajaja*	44
	Black-crowned Night Heron	*Nycticorax nycticorax*	100
	Little Blue Heron	*Egretta caerulea*	100
	Tricolored Heron	*Egretta tricolor*	200
	Laughing Gull	*Larus atricilla*	350
	Snowy Egret	*Egretta thula*	420
	Great Egret	*Casmerodius albus*	460
	White Ibis	*Eudocimus albus*	750
	Total		**2,424**
14-003	Tricolored Heron	*Egretta tricolor*	120
	Laughing Gull	*Larus atricilla*	300
	White Ibis	*Eudocimus albus*	800
	Total		**1,220**
14-004	Forster's Tern	*Sterna forsteri*	470
	Total		**470**
15-001	Little Blue Heron	*Egretta caerulea*	6
	Snowy Egret	*Egretta thula*	44
	Tricolored Heron	*Egretta tricolor*	52
	Black-crowned Night Heron	*Nycticorax nycticorax*	55
	Roseate Spoonbill	*Ajaia ajaja*	55
	White Ibis	*Eudocimus albus*	125
	Black Skimmer	*Rynchops niger*	245
	Great Egret	*Casmerodius albus*	397
	Brown Pelican	*Pelecanus occidentalis*	3,637
	Caspian Tern	*Hydroprogne caspia*	5,152
	Laughing Gull	*Larus atricilla*	9,140
	Total		**18,908**

Appendix E
Wading Bird/Seabird Rookeries
Number of Birds and Rookeries Observed in 2001

Rookery ID	Common Name	Scientific Name	Number
17-001	Snowy Egret	*Egretta thula*	1
	Black-crowned Night Heron	*Nycticorax nycticorax*	4
	Little Blue Heron	*Egretta caerulea*	5
	Caspian Tern	*Hydroprogne caspia*	8
	Tricolored Heron	*Egretta tricolor*	42
	Roseate Spoonbill	*Ajaia ajaja*	75
	White Ibis	*Eudocimus albus*	75
	Black Skimmer	*Rynchops niger*	319
	Forster's Tern	*Sterna forsteri*	342
	Laughing Gull	*Larus atricilla*	2,161
	Total		**3,032**
17-002	Tricolored Heron	*Egretta tricolor*	10
	Caspian Tern	*Hydroprogne caspia*	32
	Little Blue Heron	*Egretta caerulea*	34
	Black Skimmer	*Rynchops niger*	169
	Laughing Gull	*Larus atricilla*	947
	Total		**1,192**
17-003	Laughing Gull	*Larus atricilla*	7
	Caspian Tern	*Hydroprogne caspia*	10
	Forster's Tern	*Sterna forsteri*	10
	BLSK		60
	Total		**87**
17-004	Caspian Tern	*Hydroprogne caspia*	4
	Black Skimmer	*Rynchops niger*	20
	Laughing Gull	*Larus atricilla*	178
	Total		**202**
17-005	Laughing Gull	*Larus atricilla*	16
	Total		**16**
17-006	Royal Tern	*Thalasseus maximus*	2
	Laughing Gull	*Larus atricilla*	22
	White Pelican	*Pelecanus erythrorhynchos*	38
	Forster's Tern	*Sterna forsteri*	101
	Total		**163**
18-002	Great Egret	*Casmerodius albus*	2
	Little Blue Heron	*Egretta caerulea*	2
	Yellow-crowned Night Heron	*Nyctanassa violacea*	22
	White Ibis	*Eudocimus albus*	24
	Total		**50**
18-003	Least Tern	*Sterna albifrous*	19
	Black Skimmer	*Rynchops niger*	74
	Total		**93**
18-004	Forster's Tern	*Sterna forsteri*	23
	Laughing Gull	*Larus atricilla*	306
	Total		**329**

Appendix E
Wading Bird/Seabird Rookeries
Number of Birds and Rookeries Observed in 2001

Rookery ID	Common Name	Scientific Name	Number
18-005	Laughing Gull	*Larus atricilla*	44
	Forster's Tern	*Sterna forsteri*	600
	Total		**644**
18-006	Yellow-crowned Night Heron	*Nyctanassa violacea*	1
	Roseate Spoonbill	*Ajaia ajaja*	6
	Black-crowned Night Heron	*Nycticorax nycticorax*	143
	Tricolored Heron	*Egretta tricolor*	252
	Little Blue Heron	*Egretta caerulea*	372
	Great Egret	*Casmerodius albus*	718
	Snowy Egret	*Egretta thula*	755
	Total		**2,247**
19-001	Black Skimmer	*Rynchops niger*	22
	Forster's Tern	*Sterna forsteri*	72
	Total		**94**
19-002	White Pelican	*Pelecanus erythrorhynchos*	27
	Royal Tern	*Thalasseus maximus*	250
	Forster's Tern	*Sterna forsteri*	350
	Brown Pelican	*Pelecanus occidentalis*	1,510
	Caspian Tern	*Hydroprogne caspia*	2,700
	Laughing Gull	*Larus atricilla*	4,422
	Total		**9,259**
TOTAL FOR ALL ROOKERIES			**87,174**

Appendix F
Vegetation Biomass
Dry Weight and Number of Stems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
BAL1	Salt grass	*Distichlis spicata*	10/4/2001	0.1	48.091	45
BAL1	Wire grass	*Spartina patens*	10/4/2001	0.1	51.401	32
BAL1	DEAD		10/4/2001	0.1	75.894	
BAL3	Salt grass	*Distichlis spicata*	10/4/2001	0.1	17.375	36
BAL3	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	27.153	9
BAL3	DEAD		10/4/2001	0.1	55.778	
BAL4	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	29.205	7
BAL4	Wire grass	*Spartina patens*	10/4/2001	0.1	2.478	5
BAL4	DEAD		10/4/2001	0.1	43.398	
BAL5	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	40.883	15
BAL5	DEAD		10/4/2001	0.1	48.336	
BAL6	Salt grass	*Distichlis spicata*	10/4/2001	0.1	3.356	4
BAL6	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	52.66	9
BAL6	DEAD		10/4/2001	0.1	54.605	
BAL7	Salt grass	*Distichlis spicata*	10/4/2001	0.1	9.261	20
BAL7	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	12.025	4
BAL7	Wire grass	*Spartina patens*	10/4/2001	0.1	51.11	65
BAL7	DEAD		10/4/2001	0.1	15.172	
BAL8	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	111.24	32
BAL8	DEAD		10/4/2001	0.1	44.914	
BAL9	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	92.393	43
BAL9	DEAD		10/4/2001	0.1	117.93	
BAL10	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	75.724	25
BAL10	DEAD		10/4/2001	0.1	36.393	
BAR1	Salt grass	*Distichlis spicata*	10/4/2001	0.1	0.472	1
BAR1	Saltmarsh lythrum	*Lythrum lineare*	10/4/2001	0.1	2.337	1
BAR1	Goldenrod	*Solidago spp.*	10/4/2001	0.1	103.34	1
BAR1	DEAD		10/4/2001	0.1	1.336	
BAR2	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/4/2001	0.1	16.639	4
BAR2	Saltgrass	*Distichlis spicata*	10/4/2001	0.1	35.441	40
BAR2	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	40.234	9
BAR2	Wire grass	*Spartina patens*	10/4/2001	0.1	16.589	13
BAR2	DEAD		10/4/2001	0.1	66.134	
BAR3	Saltgrass	*Distichlis spicata*	10/4/2001	0.1	12.484	19
BAR3	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	159.61	14
BAR3	DEAD		10/4/2001	0.1	50.871	
BAR4	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	113.69	16
BAR4	DEAD		10/4/2001	0.1	30.826	
BAR5	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	77.933	21
BAR5	DEAD		10/4/2001	0.1	25.572	
BAR6	Saltgrass	*Distichlis spicata*	10/4/2001	0.1	14.032	25
BAR6	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	76.039	24
BAR6	DEAD		10/4/2001	0.1	68.698	
BAR7	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	44.224	14
BAR7	Wire grass	*Spartina patens*	10/4/2001	0.1	16.568	35
BAR7	DEAD		10/4/2001	0.1	48.222	
BAR8	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	168.15	56
BAR8	DEAD		10/4/2001	0.1	82.053	
BAR9	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	99.642	22
BAR9	DEAD		10/4/2001	0.1	50.912	
BAR10	Smooth cordgrass	*Spartina alterniflora*	10/4/2001	0.1	73.072	23
BAR10	DEAD		10/4/2001	0.1	29.098	

Appendix F
Vegetation Biomass
Dry Weight and Number ofStems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
FAL1	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	116.07	73
FAL1	Dotted Smartweed	*Polygonum punctatum*	10/5/2001	0.25	3.025	2
FAL1	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	86.96	8
FAL2	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	15.156	16
FAL2	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	121.85	87
FAL2	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	1.793	2
FAL2	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	0.412	5
FAL2	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	50.132	9
FAL2	Deer Pea	*Vigna luteola*	10/5/2001	0.25	13.627	6
FAL2	Goldenrod	*Solidago spp.*	10/5/2001	0.25	3.984	1
FAL2	DEAD		10/5/2001	0.25	129.15	
FAL2	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.391	1
FAL3	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	1.427	4
FAL3	Wax Myrtle	*Myrica cerifera*	10/5/2001	0.25	339.4	6
FAL3	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	36.152	12
FAL3	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	0.21	2
FAL3	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	4.054	3
FAL3	Goldenrod	*Solidago spp.*	10/5/2001	0.25	40.208	6
FAL3	DEAD		10/5/2001	0.25	25.359	
FAL3	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	2.753	15
FAL4	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	5.747	10
FAL4	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	96.332	37
FAL4	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	49.887	23
FAL4	Deer Pea	*Vigna luteola*	10/5/2001	0.25	3.871	4
FAL4	Goldenrod	*Solidago spp.*	10/5/2001	0.25	35.063	12
FAL4	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	1.638	4
FAL5	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	5.899	8
FAL5	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	47.11	43
FAL5	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	0.264	2
FAL5	Deer Pea	*Vigna luteola*	10/5/2001	0.25	1.05	1
FAL5	Goldenrod	*Solidago spp.*	10/5/2001	0.25	18.118	8
FAL5	Unidentified Flora		10/5/2001	0.25	0.831	6
FAL5	DEAD		10/5/2001	0.25	99.849	
FAL5	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	2.822	8
FAL6	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	9.1678	12
FAL6	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	63.823	60
FAL6	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	0.068	1
FAL6	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	0.2314	3
FAL6	Softstem Bulrush	*Scirpus tabernaemontani*	10/5/2001	0.25	0.964	1
FAL6	Goldenrod	*Solidago spp.*	10/5/2001	0.25	38.718	14
FAL6	Unidentified Flora		10/5/2001	0.25	1.0852	2
FAL6	DEAD		10/5/2001	0.25	80.282	
FAL6	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.765	6
FAL7	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	61.76	36
FAL7	Deer Pea	*Vigna luteola*	10/5/2001	0.25	10.739	8
FAL7	Mallow	*Hibiscus spp.*	10/5/2001	0.25	0.314	1
FAL7	Goldenrod	*Solidago spp.*	10/5/2001	0.25	79.605	23
FAL7	Unidentified Flora		10/5/2001	0.25	4.4583	6
FAL7	DEAD		10/5/2001	0.25	83.555	
FAL7	Smartweed	*Polygonum punctatum*	10/5/2001	0.25	13.837	1
FAL8	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	8.51	11
FAL8	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	155.91	105

Appendix F
Vegetation Biomass
Dry Weight and Number ofStems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
FAL8	Deer Pea	*Vigna luteola*	10/5/2001	0.25	1.72	3
FAL8	Goldenrod	*Solidago spp.*	10/5/2001	0.25	11.804	5
FAL8	Unidentified Flora		10/5/2001	0.25	2.744	7
FAL8	DEAD		10/5/2001	0.25	32.335	
FAL8	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	1.165	2
FAL9	False Nutsedge	*Cyperus strigosus*	10/5/2001	0.25	0.729	2
FAL9	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	9.854	18
FAL9	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	75.955	51
FAL9	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	9.876	12
FAL9	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	4.221	8
FAL9	Broadleaf Cattail	*Typha latifolia*	10/5/2001	0.25	88.741	4
FAL9	Deer Pea	*Vigna luteola*	10/5/2001	0.25	6.182	4
FAL9	Goldenrod	*Solidago spp.*	10/5/2001	0.25	34.374	14
FAL9	Unidentified Flora		10/5/2001	0.25	2.523	12
FAL9	DEAD		10/5/2001	0.25	75.668	
FAL9	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	3.364	18
FAL10	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	13.743	15
FAL10	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	209.04	94
FAL10	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	0.491	5
FAL10	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	6.0579	19
FAL10	Deer Pea	*Vigna luteola*	10/5/2001	0.25	6.274	5
FAL10	Goldenrod	*Solidago spp.*	10/5/2001	0.25	50.011	7
FAL10	DEAD		10/5/2001	0.25	55.693	
FAL10	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.294	2
FAR1	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	7.3764	13
FAR1	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	16.161	13
FAR1	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	5.582	8
FAR1	Deer Pea	*Vigna luteola*	10/5/2001	0.25	4.015	4
FAR1	Goldenrod	*Solidago spp.*	10/5/2001	0.25	55.523	11
FAR1	DEAD		10/5/2001	0.25	66.204	
FAR1	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	2.898	15
FAR2	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	6.401	6
FAR2	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	91.667	27
FAR2	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	6.866	5
FAR2	Deer Pea	*Vigna luteola*	10/5/2001	0.25	2.357	2
FAR2	Goldenrod	*Solidago spp.*	10/5/2001	0.25	42.822	13
FAR2	DEAD		10/5/2001	0.25	55.66	
FAR2	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.753	9
FAR3	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	45.006	25
FAR3	Deer Pea	*Vigna luteola*	10/5/2001	0.25	0.954	2
FAR3	Goldenrod	*Solidago spp.*	10/5/2001	0.25	11.71	4
FAR3	Unidentified Flora		10/5/2001	0.25	37.342	21
FAR3	DEAD		10/5/2001	0.25	66.108	
FAR3	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.184	1
FAR4	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	96.71	59
FAR4	Goldenrod	*Solidago spp.*	10/5/2001	0.25	56.841	6
FAR4	Unidentified Flora		10/5/2001	0.25	1.193	4
FAR4	DEAD		10/5/2001	0.25	116	
FAR4	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.199	2
FAR5	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	0.798	3
FAR5	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	28.13	32
FAR5	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	1.224	4

Appendix F
Vegetation Biomass
Dry Weight and Number of Stems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
FAR5	Deer Pea	*Vigna luteola*	10/5/2001	0.25	1.085	2
FAR5	Goldenrod	*Solidago spp.*	10/5/2001	0.25	20.555	4
FAR5	Unidentified Flora		10/5/2001	0.25	11.436	33
FAR5	DEAD		10/5/2001	0.25	61.185	
FAR5	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	3.151	16
FAR6	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	11.142	10
FAR6	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	139.55	62
FAR6	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	2.085	5
FAR6	Deer Pea	*Vigna luteola*	10/5/2001	0.25	4.411	7
FAR6	Goldenrod	*Solidago spp.*	10/5/2001	0.25	42.794	10
FAR6	Unidentified Flora		10/5/2001	0.25	3.055	6
FAR6	DEAD		10/5/2001	0.25	46.658	
FAR6	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	4.827	11
FAR7	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	2.854	10
FAR7	Saltmarsh lythrum	*Lythrum lineare*	10/5/2001	0.25	3.36	1
FAR7	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	78.672	70
FAR7	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	1.153	5
FAR7	Goldenrod	*Solidago spp.*	10/5/2001	0.25	23.091	13
FAR7	Unidentified Flora		10/5/2001	0.25	3.601	5
FAR7	Saltmarsh Fleabane	*Pluchea purpurascens*	10/5/2001	0.25	0.588	1
FAR7	DEAD		10/5/2001	0.25	24.188	
FAR7	Grass-leaved Goldenrod	*Euthamia graminifolia*	10/5/2001	0.25	15.368	1
FAR7	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.315	3
FAR8	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	11.769	11
FAR8	Wax Myrtle	*Myrica cerifera*	10/5/2001	0.25	1.925	1
FAR8	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	122.95	85
FAR8	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	1.155	2
FAR8	Arrowhead	*Sagittaria latifolia*	10/5/2001	0.25	5.043	7
FAR8	Deer Pea	*Vigna luteola*	10/5/2001	0.25	3.764	3
FAR8	Goldenrod	*Solidago spp.*	10/5/2001	0.25	38.069	7
FAR8	DEAD		10/5/2001	0.25	56.889	
FAR9	False Nutsedge	*Cyperus strigosus*	10/5/2001	0.25	0.8963	5
FAR9	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	6.879	12
FAR9	Wax Myrtle	*Myrica cerifera*	10/5/2001	0.25	166.36	3
FAR9	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	40.038	25
FAR9	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	0.8661	4
FAR9	Deer Pea	*Vigna luteola*	10/5/2001	0.25	0.35	1
FAR9	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	0.1919	2
FAR9	Goldenrod	*Solidago spp.*	10/5/2001	0.25	45.012	13
FAR9	Unidentified Flora		10/5/2001	0.25	2.1825	12
FAR9	DEAD		10/5/2001	0.25	34.336	
FAR9	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.4113	3
FAR10	False Nutsedge	*Cyperus strigosus*	10/5/2001	0.25	2.244	10
FAR10	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	18.491	19
FAR10	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	79.57	52
FAR10	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	0.742	3
FAR10	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	0.883	4
FAR10	Goldenrod	*Solidago spp.*	10/5/2001	0.25	27.211	6
FAR10	Unidentified Flora		10/5/2001	0.25	0.81	8
FAR10	DEAD		10/5/2001	0.25	37.595	
FAR10	Ten Angle Pipewort	*Ericaulon decangulare*	10/5/2001	0.25	1.113	2
FAR10	Canada Rush	*Juncus canadensis*	10/5/2001	0.25	5.216	2

Appendix F
Vegetation Biomass
Dry Weight and Number of Stems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
FAR10	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.474	3
FBL1	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	20.421	14
FBL1	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	12.054	9
FBL1	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	87.455	26
FBL1	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	0.71	22
FBL1	Unidentified Flora		10/5/2001	0.25	27.458	2
FBL1	DEAD		10/5/2001	0.25	105.71	
FBL1	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.4918	2
FBL2	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	0.776	1
FBL2	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	50.722	28
FBL2	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	0.6274	1
FBL2	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	3.137	5
FBL2	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	4.455	4
FBL2	Lizard Tail	*Saururus cernuus*	10/5/2001	0.25	5.195	4
FBL2	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	1.623	6
FBL2	DEAD		10/5/2001	0.25	26.043	
FBL2	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	2.6	12
FBL3	Fragrant Flatsedge	*Cyperus odoratus*	10/5/2001	0.25	0.105	1
FBL3	False Nutsedge	*Cyperus strigosus*	10/5/2001	0.25	0.505	3
FBL3	Umbrella Pennywort	*Hydrocotyle umbellata*	10/5/2001	0.25	0.063	1
FBL3	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	3.79	6
FBL3	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	99.177	84
FBL3	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	2.876	9
FBL3	Goldenrod	*Solidago spp.*	10/5/2001	0.25	0.45	1
FBL3	DEAD		10/5/2001	0.25	22.286	
FBL3	Ten Angle Pipewort	*Ericaulon decangulare*	10/5/2001	0.25	2.02	4
FBL3	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	3.804	23
FBL4	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	10.805	15
FBL4	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	87.25	45
FBL4	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	2.106	8
FBL4	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	19.288	8
FBL4	Great Duckweed	*Spirodela polyrhiza*	10/5/2001	0.25	0.012	1
FBL4	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	0.437	4
FBL4	DEAD		10/5/2001	0.25	53.631	
FBL4	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.0321	1
FBL5	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	0.699	1
FBL5	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	112.18	57
FBL5	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	0.374	2
FBL5	DEAD		10/5/2001	0.25	47.272	
FBL5	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	3.629	16
FBL6	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	2.804	3
FBL6	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	10.344	14
FBL6	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	0.564	2
FBL6	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	26.845	8
FBL6	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	0.132	3
FBL6	DEAD		10/5/2001	0.25	46.886	
FBL6	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	2.991	16
FBL7	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/5/2001	0.25	4.317	13
FBL7	False Nutsedge	*Cyperus strigosus*	10/5/2001	0.25	2.6664	2
FBL7	Swamp Loosestrife	*Decodon verticillatus*	10/5/2001	0.25	51.469	11
FBL7	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	2.047	3
FBL7	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	66.14	45

Appendix F
Vegetation Biomass
Dry Weight and Number of Stems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
FBL7	Dotted Smartweed	*Polygonum punctatum*	10/5/2001	0.25	0.024	1
FBL7	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	1.476	9
FBL7	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	0.297	1
FBL7	Unidentified Flora		10/5/2001	0.25	4.49	36
FBL7	DEAD		10/5/2001	0.25	72.376	
FBL7	Bluestem	*Andropogon spp.*	10/5/2001	0.25	21.063	5
FBL7	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	11.154	20
FBL8	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	4.889	4
FBL8	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	102.24	73
FBL8	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	0.597	3
FBL8	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	0.338	3
FBL8	Unidentified Flora		10/5/2001	0.25	1.152	1
FBL8	DEAD		10/5/2001	0.25	52.474	
FBL8	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	4.385	20
FBL9	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	0.376	2
FBL9	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	44.03	30
FBL9	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	0.792	5
FBL9	Unidentified Flora		10/5/2001	0.25	43.749	19
FBL9	DEAD		10/5/2001	0.25	74.013	
FBL9	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	6.521	26
FBL10	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	9.934	16
FBL10	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	99.597	81
FBL10	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	1.171	6
FBL10	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	1.955	14
FBL10	DEAD		10/5/2001	0.25	96.219	
FBR1	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	37.569	23
FBR1	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	171.55	71
FBR1	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	8.15	6
FBR1	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	0.312	1
FBR1	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	44.842	11
FBR1	DEAD		10/5/2001	0.25	105.76	
FBR2	Soft Flatsedge	*Cyperus haspan*	10/5/2001	0.25	0.069	1
FBR2	Wax Myrtle	*Myrica cerifera*	10/5/2001	0.25	260.15	20
FBR2	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	27.051	24
FBR2	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	1.062	7
FBR2	Unidentified Flora		10/5/2001	0.25	0.786	3
FBR2	DEAD		10/5/2001	0.25	413.48	
FBR2	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	2.061	8
FBR3	Soft Flatsedge	*Cyperus haspan*	10/5/2001	0.25	0.34	1
FBR3	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	9.162	12
FBR3	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	123.55	103
FBR3	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	2.559	27
FBR3	Arrowhead	*Sagittaria latifolia*	10/5/2001	0.25	7.6168	8
FBR3	Deer Pea	*Vigna luteola*	10/5/2001	0.25	0.792	2
FBR3	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	2.047	43
FBR3	Goldenrod	*Solidago spp.*	10/5/2001	0.25	19.716	11
FBR3	Unidentified Flora		10/5/2001	0.25	9.045	26
FBR3	DEAD		10/5/2001	0.25	58.589	
FBR3	Bluestem	*Andropogon spp.*	10/5/2001	0.25	5.835	2
FBR3	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	2.668	31
FBR4	False Nutsedge	*Cyperus strigosus*	10/5/2001	0.25	0.467	2
FBR4	White Spikerush	*Eleocharis albida*	10/5/2001	0.25	0.06	1

Appendix F
Vegetation Biomass
Dry Weight and Number of Stems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
FBR4	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	44.381	35
FBR4	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	1.705	6
FBR4	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	50.109	18
FBR4	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	3.013	28
FBR4	Mallow	*Hibiscus spp.*	10/5/2001	0.25	0.849	2
FBR4	Unidentified Flora		10/5/2001	0.25	0.276	2
FBR4	DEAD		10/5/2001	0.25	97.619	
FBR4	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	59.967	132
FBR5	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	8.631	5
FBR5	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	1.463	7
FBR5	Leatherleaf Fern	*Rumohra adiantiformis*	10/5/2001	0.25	56.503	22
FBR5	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	0.621	5
FBR6	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	38.617	16
FBR6	Southern Wild Rice	*Zizaniopsis miliacea*	10/5/2001	0.25	293.74	12
FBR6	DEAD		10/5/2001	0.25	79.882	
FBR7	Saltmarsh Morning Glory	*Ipomoea sagittata*	10/5/2001	0.25	0.187	3
FBR7	Wax Myrtle	*Myrica cerifera*	10/5/2001	0.25	16.648	5
FBR7	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	112.12	57
FBR7	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	1.244	15
FBR7	DEAD		10/5/2001	0.25	38.955	
FBR7	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	6.724	25
FBR8	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	6.691	7
FBR8	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	69.204	33
FBR8	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	0.3805	1
FBR8	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	20.959	6
FBR8	Unidentified Flora		10/5/2001	0.25	0.628	2
FBR8	DEAD		10/5/2001	0.25	99.404	
FBR8	Giant Ragweed	*Ambrosia trifida*	10/5/2001	0.25	7.882	2
FBR9	Saltmarsh Morning Glory	*Ipomoea sagittata*	10/5/2001	0.25	0.028	1
FBR9	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	48.819	30
FBR9	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	0.114	1
FBR9	Bulltongue	*Sagittaria lancifolia*	10/5/2001	0.25	2.474	1
FBR9	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	0.863	6
FBR9	Unidentified Flora		10/5/2001	0.25	0.252	1
FBR9	DEAD		10/5/2001	0.25	36.538	
FBR9	Golden Leather Fern	*Acrostichum aureum*	10/5/2001	0.25	8.327	11
FBR9	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	1.3572	4
FBR10	Saltmarsh Morning Glory	*Ipomoea sagittata*	10/5/2001	0.25	0.326	1
FBR10	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	12.482	17
FBR10	Saltmarsh lythrum	*Lythrum lineare*	10/5/2001	0.25	1.616	1
FBR10	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	71.468	47
FBR10	Arrow leaved Tearthumb	*Polygonum sagittatum*	10/5/2001	0.25	0.385	3
FBR10	Tall Beakrush	*Rhynchospora macrostachya*	10/5/2001	0.25	0.633	2
FBR10	Long Eleocharis	*Eleocharis rostellata*	10/5/2001	0.25	1.401	8
FBR10	Unidentified Flora		10/5/2001	0.25	11.284	2
FBR10	DEAD		10/5/2001	0.25	80.995	
FBR10	Marsh Fern	*Thelypteris thelypteroides*	10/5/2001	0.25	21.989	55
FC1	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	473.11	237
FC1	Deer Pea	*Vigna luteola*	10/5/2001	0.25	42.911	12
FC1	DEAD		10/5/2001	0.25	173.78	
FC2	Rice Cutgrass	*Leersia oryzoides*	10/5/2001	0.25	0.286	1
FC2	Maidencane	*Panicum hemitomon*	10/5/2001	0.25	209.69	79

Appendix F
Vegetation Biomass
Dry Weight and Number ofStems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
IC1	Olney Three-Square	*Scirpus olneyi*	10/3/2001	0.1	19.769	24
IC1	DEAD		10/3/2001	0.1	9.596	
IC2	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.1	0.592	2
IC2	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	3.264	5
IC2	Wiregrass	*Spartina patens*	10/3/2001	0.1	9.689	32
IC2	Olney Three-Square	*Scirpus olneyi*	10/3/2001	0.1	53.07	104
IC2	DEAD		10/3/2001	0.1	8.205	
IC3	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	1.266	1
IC3	Wiregrass	*Spartina patens*	10/3/2001	0.1	74.778	84
IC3	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	8.391	57
IC3	DEAD		10/3/2001	0.1	86.031	
IC4	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	2.092	2
IC4	Black Needle Rush	*Juncus roemerianus*	10/3/2001	0.1	106.48	121
IC4	Deer Pea	*Vigna luteola*	10/3/2001	0.1	1.003	3
IC4	Wiregrass	*Spartina patens*	10/3/2001	0.1	10.819	17
IC4	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	14.854	110
IC4	Olney Three-Square	*Scirpus olneyi*	10/3/2001	0.1	11.402	18
IC4	DEAD		10/3/2001	0.1	101.16	
IC5	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	0.672	13
IC5	Gulf Spikerush	*Eleocharis cellulosa*	10/3/2001	0.1	3.481	21
IC5	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.1	1.461	5
IC5	Saltmarsh Bulrush	*Scirpus robustus*	10/3/2001	0.1	17.845	9
IC5	Wiregrass	*Spartina patens*	10/3/2001	0.1	11.951	43
IC5	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	0.112	2
IC5	DEAD		10/3/2001	0.1	11.92	
IC6	Umbrella Pennywort	*Hydrocotyle umbellata*	10/3/2001	0.1	0.334	2
IC6	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.1	1.751	2
IC6	Wiregrass	*Spartina patens*	10/3/2001	0.1	20.443	45
IC6	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	1.999	26
IC6	Olney Three-Square	*Scirpus olneyi*	10/3/2001	0.1	0.784	2
IC6	DEAD		10/3/2001	0.1	78.266	
IC7	Marsh Swallow Wort	*Cynanchum angustifolium*	10/3/2001	0.1	2.141	2
IC7	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	2.445	6
IC7	Wiregrass	*Spartina patens*	10/3/2001	0.1	33.083	165
IC7	Olney Three-Square	*Scirpus olneyi*	10/3/2001	0.1	20.85	28
IC7	DEAD		10/3/2001	0.1	27.214	
IC8	Coast Bacopa	*Bacopa monnieri*	10/3/2001	0.1	0.581	2
IC8	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	1.709	3
IC8	Wiregrass	*Spartina patens*	10/3/2001	0.1	27.341	59
IC8	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	1.353	24
IC8	Olney Three-Square	*Scirpus olneyi*	10/3/2001	0.1	25.953	61
IC8	DEAD		10/3/2001	0.1	29.217	
IC9	Coast Bacopa	*Bacopa monnieri*	10/3/2001	0.1	1.165	2
129	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	0.593	2
129	Wiregrass	*Spartina patens*	10/3/2001	0.1	5.666	9
129	Olney Three-Square	*Scirpus olneyi*	10/3/2001	0.1	34.84	76
129	DEAD		10/3/2001	0.1	21.226	
IC10	Southern Amaranth	*Amaranthus australis*	10/3/2001	0.1	1.397	1
IC10	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.1	1.023	2
IC10	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	0.738	2
IC10	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.1	6.042	5
IC10	Bulltongue	*Sagittaria lancifolia*	10/3/2001	0.1	20.35	16

Appendix F
Vegetation Biomass
Dry Weight and Number ofStems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
IAL4	Dotted Smartweed	*Polygonum punctatum*	10/3/2001	0.25	14.87	12
IAL4	Wiregrass	*Spartina patens*	10/3/2001	0.25	277.81	87
IAL4	Olney Three-Square	*Scirpus olneyi*	10/3/2001	0.25	26.981	31
IAL4	DEAD		10/3/2001	0.25	105.51	
IAL4	Paspalum	*Paspalum spp.*	10/3/2001	0.25	12.534	15
IAL5	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.25	7.757	6
IAL5	Saltgrass	*Distichlis spicata*	10/3/2001	0.25	51.014	47
IAL5	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.25	2.733	7
IAL5	Dotted Smartweed	*Polygonum punctatum*	10/3/2001	0.25	36.741	39
IAL5	Bulltongue	*Sagittaria latifolia*	10/3/2001	0.25	35.8	19
IAL5	Wiregrass	*Spartina patens*	10/3/2001	0.25	104.13	172
IAL5	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.25	1.447	16
IAL5	DEAD		10/3/2001	0.25	80.59	
IAR1	Alligator Weed	*Alternanthera philoxeroides*	10/3/2001	0.25	76.74	57
IAR1	Southern Amaranth	*Amaranthus australis*	10/3/2001	0.25	1.161	1
IAR1	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.25	10.966	5
IAR1	Common Hornwort	*Ceratophyllum demersum*	10/3/2001	0.25	1.102	19
IAR1	Saltgrass	*Distichlis spicata*	10/3/2001	0.25	3.023	3
IAR1	Gulf Spikerush	*Eleocharis cellulosa*	10/3/2001	0.25	0.287	1
IAR1	Umbrella Pennywort	*Hydrocotyle umbellata*	10/3/2001	0.25	7.175	25
IAR1	Dotted Smartweed	*Polygonum punctatum*	10/3/2001	0.25	15.525	12
IAR1	Great Duckweed	*Spirodela polyrhiz*	10/3/2001	0.25	23.397	400
IAR1	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.25	6.447	48
IAR1	Unidentified Flora		10/3/2001	0.25	2.332	2
IAR1	DEAD		10/3/2001	0.25	5.228	
IAR1	Paspalum	*Paspalum spp.*	10/3/2001	0.25	52.225	102
IAR2	Seaside Heliotrope	*Heliotropium curassavicum*	10/3/2001	0.25	0.178	1
IAR2	Paspalum	*Paspalum spp.*	10/3/2001	0.25	155.21	580
IAR3	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.25	10.524	7
IAR3	Saltgrass	*Distichlis spicata*	10/3/2001	0.25	107.41	200
IAR3	Gulf Spikerush	*Eleocharis cellulosa*	10/3/2001	0.25	23.585	151
IAR3	Dotted Smartweed	*Polygonum punctatum*	10/3/2001	0.25	50.824	12
IAR3	Bulltongue	*Sagittaria lancifolia*	10/3/2001	0.25	18.387	17
IAR3	DEAD		10/3/2001	0.25	78.527	
IAR4	Alligator Weed	*Alternanthera philoxeroides*	10/3/2001	0.25	8.961	10
IAR4	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.25	72.007	12
IAR4	Saltgrass	*Distichlis spicata*	10/3/2001	0.25	32.351	73
IAR4	Gulf Spikerush	*Eleocharis cellulosa*	10/3/2001	0.25	25.411	204
IAR4	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.25	1.226	1
IAR4	Maidencane	*Panicum hemitomon*	10/3/2001	0.25	8.074	4
IAR4	Bulltongue	*Sagittaria lancifolia*	10/3/2001	0.25	20.009	14
IAR4	Foxtail	*Setaria spp.*	10/3/2001	0.25	0.665	1
IAR4	DEAD		10/3/2001	0.25	75.638	
IAR5	Alligator Weed	*Alternanthera philoxeroides*	10/3/2001	0.25	4.377	54
IAR5	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.25	4.138	5
IAR5	Gulf Spikerush	*Eleocharis cellulosa*	10/3/2001	0.25	23.57	119
IAR5	Wiregrass	*Spartina patens*	10/3/2001	0.25	5.457	6
IAR5	DEAD		10/3/2001	0.25	94.066	
IAR5	Paspalum	*Paspalum spp.*	10/3/2001	0.25	163.45	122
IC1	Coast Bacopa	*Bacopa monnieri*	10/3/2001	0.1	0.704	2
IC1	Dwarf Spikerush	*Eleocharis parvula*	10/3/2001	0.1	15.336	600
IC1	Maidencane	*Panicum hemitomon*	10/3/2001	0.1	1.469	1

Appendix F
Vegetation Biomass
Dry Weight and Number of Stems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
IC10	Wiregrass	*Spartina patens*	10/3/2001	0.1	191.87	133
IC10	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	35.21	286
IPL1	Alligator Weed	*Alternanthera philoxeroides*	10/3/2001	0.1	0.054	1
IPL1	Dotted Smartweed	*Polygonum punctatum*	10/3/2001	0.1	0.428	1
IPL1	Bulltongue	*Sagittaria lancifolia*	10/3/2001	0.1	7.8308	15
IPL1	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	5.6047	54
IPL1	DEAD		10/3/2001	0.1	15.755	
IPL2	Deer Pea	*Vigna luteola*	10/3/2001	0.1	0.212	1
IPL2	Wiregrass	*Spartina patens*	10/3/2001	0.1	82.383	92
IPL3	Deer Pea	*Vigna luteola*	10/3/2001	0.1	12.884	8
IPL3	Wiregrass	*Spartina patens*	10/3/2001	0.1	23.552	15
IPL3	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	1.718	12
IPL3	DEAD		10/3/2001	0.1	49.771	
IPL3	Bluestem	*Andropogon spp.*	10/3/2001	0.1	68.518	17
IPL3	Marsh Fern	*Thelypteris thelypteroides*	10/3/2001	0.1	0.564	3
IPL4	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	0.685	2
IPL4	Marsh Hibiscus	*Hibiscus moscheutos*	10/3/2001	0.1	23.627	2
IPL4	Deer Pea	*Vigna luteola*	10/3/2001	0.1	7.248	4
IPL4	DEAD		10/3/2001	0.1	30.294	
IPL4	Marsh Fern	*Thelypteris thelypteroides*	10/3/2001	0.1	0.036	1
IPL5	Bulltongue	*Sagittaria lancifolia*	10/3/2001	0.1	5.472	11
IPL5	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	32.561	336
IPL5	DEAD		10/3/2001	0.1	14.097	
IPL6	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.1	2.884	1
IPL6	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.1	0.773	1
IPL6	Deer Pea	*Vigna luteola*	10/3/2001	0.1	0.184	1
IPL6	Wiregrass	*Spartina patens*	10/3/2001	0.1	6.546	7
IPL6	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	14.244	102
IPL6	DEAD		10/3/2001	0.1	51.349	
IPL7	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	2.601	5
IPL7	Umbrella Pennywort	*Hydrocotyle umbellata*	10/3/2001	0.1	0.366	7
IPL7	Deer Pea	*Vigna luteola*	10/3/2001	0.1	0.43	1
IPL7	Wiregrass	*Spartina patens*	10/3/2001	0.1	16.453	145
IPL7	DEAD		10/3/2001	0.1	1.193	
IPL8	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.1	2.078	2
IPL8	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.1	0.197	1
IPL8	Dotted Smartweed	*Polygonum punctatum*	10/3/2001	0.1	4.704	5
IPL8	Wiregrass	*Spartina patens*	10/3/2001	0.1	1.111	1
IPL8	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	17.07	222
IPL8	DEAD		10/3/2001	0.1	12.599	
IPL8	Marsh Fern	*Thelypteris thelypteroides*	10/3/2001	0.1	1.104	21
IPL9	Umbrella Pennywort	*Hydrocotyle umbellata*	10/3/2001	0.1	0.129	5
IPL9	Dotted Smartweed	*Polygonum punctatum*	10/3/2001	0.1	12.4	9
IPL9	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	10.668	151
IPL9	DEAD		10/3/2001	0.1	4.1728	
IPL10	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	2.836	3
IPL10	Saltmarsh Morning Glory	*Ipomoea sagittata*	10/3/2001	0.1	3.397	4
IPL10	Deer Pea	*Vigna luteola*	10/3/2001	0.1	0.925	1
IPL10	Wiregrass	*Spartina patens*	10/3/2001	0.1	49.984	57
IPL10	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	2.201	21
IPL10	DEAD		10/3/2001	0.1	57.735	
IPR1	Alligator Weed	*Alternanthera philoxeroides*	10/3/2001	0.1	0.098	1

Appendix F
Vegetation Biomass
Dry Weight and Number of Stems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
IPR1	White Spikerush	*Eleocharis albida*	10/3/2001	0.1	6.821	108
IPR1	Dotted Smartweed	*Polygonum punctatum*	10/3/2001	0.1	18.636	18
IPR1	Deer Pea	*Vigna luteola*	10/3/2001	0.1	1.725	1
IPR1	Smooth cordgrass	*Spartina alterniflora*	10/3/2001	0.1	61.62	31
IPR1	Wiregrass	*Spartina patens*	10/3/2001	0.1	8.497	17
IPR1	DEAD		10/3/2001	0.1	6.442	
IPR2	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	49.69	22
IPR2	Wiregrass	*Spartina patens*	10/3/2001	0.1	88.097	73
IPR2	DEAD		10/3/2001	0.1	198.97	
IPR2	Marsh Fern	*Thelypteris thelypteroides*	10/3/2001	0.1	0.084	1
IPR3	Bristlegrass	*Setaria geniculata*	10/3/2001	0.1	3.231	4
IPR3	Deer Pea	*Vigna luteola*	10/3/2001	0.1	0.168	1
IPR3	Smooth cordgrass	*Spartina alterniflora*	10/3/2001	0.1	12.231	6
IPR3	Wiregrass	*Spartina patens*	10/3/2001	0.1	26.524	32
IPR3	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	1.35	9
IPR3	DEAD		10/3/2001	0.1	125.72	
IPR4	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	14.72	6
IPR4	Gulf Spikerush	*Eleocharis cellulosa*	10/3/2001	0.1	10.532	68
IPR4	Saltmarsh Morning Glory	*Ipomoea sagittata*	10/3/2001	0.1	1.725	1
IPR4	Deer Pea	*Vigna luteola*	10/3/2001	0.1	4.661	1
IPR4	Wiregrass	*Spartina patens*	10/3/2001	0.1	54.158	33
IPR4	DEAD		10/3/2001	0.1	237.84	
IPR4	Paspalum	*Paspalum spp.*	10/3/2001	0.1	2.15	1
IPR5	Bulltongue	*Sagittaria lancifolia*	10/3/2001	0.1	13.416	17
IPR5	Deer Pea	*Vigna luteola*	10/3/2001	0.1	0.095	2
IPR5	Smooth cordgrass	*Spartina alterniflora*	10/3/2001	0.1	43.228	7
IPR5	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	1.121	17
IPR5	DEAD		10/3/2001	0.1	8.779	
IPR6	Wiregrass	*Spartina patens*	10/3/2001	0.1	92.881	48
IPR6	DEAD		10/3/2001	0.1	163.7	
IPR6	Marsh Fern	*Thelypteris thelypteroides*	10/3/2001	0.1	4.391	31
IPR7	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	1.196	1
IPR7	Wiregrass	*Spartina patens*	10/3/2001	0.1	286.39	290
IPR7	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	1.689	16
IPR7	DEAD		10/3/2001	0.1	26.651	
IPR8	Alligator Weed	*Alternanthera philoxeroides*	10/3/2001	0.1	0.816	1
IPR8	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.1	9.1196	2
IPR8	Umbrella Pennywort	*Hydrocotyle umbellata*	10/3/2001	0.1	0.144	2
IPR8	Deer Pea	*Vigna luteola*	10/3/2001	0.1	0.84	2
IPR8	Smooth cordgrass	*Spartina alterniflora*	10/3/2001	0.1	5.695	1
IPR8	Wiregrass	*Spartina patens*	10/3/2001	0.1	5.936	8
IPR8	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	17.813	169
IPR8	DEAD		10/3/2001	0.1	32.926	
IPR9	Dotted Smartweed	*Polygonum punctatum*	10/3/2001	0.1	8.914	3
IPR9	DEAD		10/3/2001	0.1	1.09	
IPR10	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	1.929	5
IPR10	Deer Pea	*Vigna luteola*	10/3/2001	0.1	0.196	1
IPR10	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	11.135	132
IPR10	DEAD		10/3/2001	0.1	34.188	
IPR10	Bluestem	*Andropogon spp.*	10/3/2001	0.1	59.57	15
IS1	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	0.725	1
IS1	Wiregrass	*Spartina patens*	10/3/2001	0.1	291.97	212

Appendix F
Vegetation Biomass
Dry Weight and Number of Stems
Collected in 2001

Plot ID	Common Name	Scientific Name	Survey Date	Plot Size	Dry Weight	No. of Stems
IS1	DEAD		10/3/2001	0.1	15.973	
IS2	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	146.02	330
IS2	Wiregrass	*Spartina patens*	10/3/2001	0.1	26.739	105
IS2	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	2.674	22
IS3	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	179.99	214
IS3	Wiregrass	*Spartina patens*	10/3/2001	0.1	676.92	576
IS3	DEAD		10/3/2001	0.1	158.01	
IS4	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.1	13.702	1
IS4	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	55.151	138
IS4	White Spikerush	*Eleocharis albida*	10/3/2001	0.1	0.15	2
IS4	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.1	12.886	4
IS4	Dotted Smartweed	*Polygonum punctatum*	10/3/2001	0.1	25.975	7
IS4	Wiregrass	*Spartina patens*	10/3/2001	0.1	188.24	249
IS4	DEAD		10/3/2001	0.1	45.097	
IS4	Paspalum	*Paspalum spp.*	10/3/2001	0.1	50.488	56
IS5	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	212.07	350
IS5	Wiregrass	*Spartina patens*	10/3/2001	0.1	120.65	140
IS5	DEAD		10/3/2001	0.1	60.998	
IS6	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.1	7.518	5
IS6	Bulltongue	*Sagittaria lancifolia*	10/3/2001	0.1	16.486	13
IS6	DEAD		10/3/2001	0.1	15.201	
IS6	Paspalum	*Paspalum spp.*	10/3/2001	0.1	247.72	316
IS7	Southern Amaranth	*Amaranthus australis*	10/3/2001	0.1	132.49	2
IS7	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	211.85	218
IS7	Wiregrass	*Spartina patens*	10/3/2001	0.1	101.53	160
IS7	DEAD		10/3/2001	0.1	99.483	
IS8	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	39.505	81
IS8	Wiregrass	*Spartina patens*	10/3/2001	0.1	92.962	213
IS8	Olney Three-Square	*Scirpus olneyi*	10/3/2001	0.1	166.36	136
IS8	DEAD		10/3/2001	0.1	197.73	
IS9	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	71.903	146
IS9	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.1	4.097	1
IS9	Smooth cordgrass	*Spartina alterniflora*	10/3/2001	0.1	2.93	
IS9	Wiregrass	*Spartina patens*	10/3/2001	0.1	156.48	170
IS9	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	25.517	161
IS9	DEAD		10/3/2001	0.1	81.265	
IS10	Perennial Saltmarsh Aster	*Aster tenuifolius*	10/3/2001	0.1	1.136	1
IS10	Saltgrass	*Distichlis spicata*	10/3/2001	0.1	0.231	1
IS10	Saltmarsh lythrum	*Lythrum lineare*	10/3/2001	0.1	1.683	2
IS10	Wiregrass	*Spartina patens*	10/3/2001	0.1	45.447	85
IS10	Long Eleocharis	*Eleocharis rostellata*	10/3/2001	0.1	11.428	148
IS10	Olney Three-Square	*Scirpus olneyi*	10/3/2001	0.1	6.1236	17
IS10	DEAD		10/3/2001	0.1	350.23	
IS10	Umbrella Sedge	*Cyperus filicinus*	10/3/2001	0.1	4.521	32

Appendix G
Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T1-1	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T1-1	Oystergrass (*Spartina alterniflora*)	1-25%	26-50%
T1-1	Wire Grass (*Spartina patens*)	76-99%	76-99%
T1-1	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	< 1% (Trace)
T1-2	Marsh Morning Glory (*Ipomoea sagittata*)		< 1% (Trace)
T1-2	Nuttall's waterhemp (*Amaranthus tamarascina*)	< 1% (Trace)	
T1-2	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T1-2	Saltmarsh Lythrum (*Lythrum lineare*)		< 1% (Trace)
T1-2	Wire Grass (*Spartina patens*)	76-99%	76-99%
T1-2	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	
T1-4	Aster (*Aster spp.*)		1-25%
T1-4	Coastal Waterhyssop (*Bacopa monnieri*)	1-25%	
T1-4	Eleo Long (*Eleocharis rostellata*)	1-25%	26-50%
T1-4	Foxtail (*Setaria spp.*)		1-25%
T1-4	Knot grass (*Paspalum distichum*)	< 1% (Trace)	
T1-4	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T1-4	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T1-4	Wire Grass (*Spartina patens*)	1-25%	51-75%
T1-5	Bulltongue (*Sagittaria lancifolia*)	26-50%	26-50%
T1-5	Eleo Long (*Eleocharis rostellata*)	26-50%	26-50%
T1-5	Marsh Aster (*Aster tenuifolius*)		< 1% (Trace)
T1-5	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T1-5	Saltgrass (*Distichlis spicata*)	< 1% (Trace)	1-25%
T1-5	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T1-5	Smartweed (*Polygonum punctatum*)		26-50%
T1-5	Unidentified Flora (*Unidentified flora*)	< 1% (Trace)	< 1% (Trace)
T1-5	Wire Grass (*Spartina patens*)	1-25%	1-25%
T1-6	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T1-6	Marsh Morning Glory (*Ipomoea sagittata*)		< 1% (Trace)
T1-6	Nuttall's waterhemp (*Amaranthus tamarascina*)	< 1% (Trace)	
T1-6	Saltgrass (*Distichlis spicata*)		26-50%
T1-6	Wire Grass (*Spartina patens*)	51-75%	
T2-2	Bulltongue (*Sagittaria lancifolia*)	1-25%	< 1% (Trace)
T2-2	Eleo Long (*Eleocharis rostellata*)		1-25%
T2-2	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T2-2	Nuttall's waterhemp (*Amaranthus tamarascina*)	< 1% (Trace)	< 1% (Trace)
T2-2	Smartweed (*Polygonum punctatum*)	26-50%	26-50%
T2-2	Wire Grass (*Spartina patens*)	76-99%	51-75%
T2-2	Yellow Cowpea (*Vigna luteola*)	26-50%	1-25%
T2-3	Bulltongue (*Sagittaria lancifolia*)		26-50%
T2-3	Coastal Waterhyssop (*Bacopa monnieri*)	< 1% (Trace)	
T2-3	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T2-3	Nuttall's waterhemp (*Amaranthus tamarascina*)	< 1% (Trace)	< 1% (Trace)
T2-3	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T2-3	Wire Grass (*Spartina patens*)	26-50%	51-75%
T2-3	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T2-4	Eleo Long (*Eleocharis rostellata*)	26-50%	
T2-4	Marsh Aster (*Aster tenuifolius*)	51-75%	
T2-4	Saltmarsh Fleabane (*Pluchea purpurascens*)	1-25%	
T2-4	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	
T2-4	Wire Grass (*Spartina patens*)	51-75%	

Appendix G
Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T2-5	Coastal Waterhyssop (*Bacopa monnieri*)	1-25%	< 1% (Trace)
T2-5	Eleo Long (*Eleocharis rostellata*)	1-25%	26-50%
T2-5	Knot grass (*Paspalum distichum*)	< 1% (Trace)	< 1% (Trace)
T2-5	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	1-25%
T2-5	Pink Ammania (*Ammania latifolia*)	< 1% (Trace)	< 1% (Trace)
T2-5	Saltmarsh Fleabane (*Pluchea purpurascens*)		< 1% (Trace)
T2-5	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T2-5	Smartweed (*Polygonum punctatum*)	< 1% (Trace)	
T2-5	Wire Grass (*Spartina patens*)	51-75%	51-75%
T2-5	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	
T2-7	Coastal Waterhyssop (*Bacopa monnieri*)	< 1% (Trace)	1-25%
T2-7	Eleo Long (*Eleocharis rostellata*)	1-25%	26-50%
T2-7	Knot grass (*Paspalum distichum*)	< 1% (Trace)	< 1% (Trace)
T2-7	Marsh Aster (*Aster tenuifolius*)	26-50%	< 1% (Trace)
T2-7	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	< 1% (Trace)
T2-7	Oystergrass (*Spartina alterniflora*)	1-25%	
T2-7	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T2-7	Unidentified Flora (*Unidentified flora*)	< 1% (Trace)	
T2-7	Wire Grass (*Spartina patens*)	1-25%	26-50%
T2-8	Coastal Waterhyssop (*Bacopa monnieri*)	1-25%	1-25%
T2-8	Olney Threesquare (*Scirpus americanus*)	< 1% (Trace)	
T2-8	Oystergrass (*Spartina alterniflora*)	76-99%	76-99%
T2-9	Camphor Weed (*Pluchea camphorata*)	1-25%	1-25%
T2-9	Coastal Waterhyssop (*Bacopa monnieri*)	< 1% (Trace)	< 1% (Trace)
T2-9	Mallow (*Hibiscus spp.*)	1-25%	1-25%
T2-9	Marsh Elder (*Iva frutescens*)	< 1% (Trace)	
T2-9	Oystergrass (*Spartina alterniflora*)	26-50%	1-25%
T2-9	Saltmarsh Aster (*Aster subulatus*)	< 1% (Trace)	< 1% (Trace)
T2-9	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	
T2-9	Wire Grass (*Spartina patens*)	26-50%	1-25%
T2-10	Knot grass (*Paspalum distichum*)	< 1% (Trace)	
T2-10	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T2-10	Marsh Elder (*Iva frutescens*)	< 1% (Trace)	
T2-10	Nutsedge (*Cyperus spp.*)	1-25%	26-50%
T2-10	Oystergrass (*Spartina alterniflora*)	76-99%	76-99%
T2-10	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T2-11	Marsh Elder (*Iva frutescens*)	< 1% (Trace)	< 1% (Trace)
T2-11	Nutsedge (*Cyperus spp.*)	26-50%	
T2-11	Oystergrass (*Spartina alterniflora*)	51-75%	51-75%
T2-11	Wire Grass (*Spartina patens*)	26-50%	26-50%
T3-1	Foxtail (*Setaria spp.*)	1-25%	
T3-1	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T3-1	Nutsedge (*Cyperus spp.*)		< 1% (Trace)
T3-1	Saltgrass (*Distichlis spicata*)		< 1% (Trace)
T3-1	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T3-1	Wire Grass (*Spartina patens*)	51-75%	51-75%
T3-1	Yellow Cowpea (*Vigna luteola*)	1-25%	< 1% (Trace)
T3-2	Aster (*Aster spp.*)	26-50%	1-25%
T3-2	Bagscale (*Sacciolepis striata*)	< 1% (Trace)	
T3-2	Coastal Waterhyssop (*Bacopa monnieri*)	< 1% (Trace)	26-50%
T3-2	Eleo Low (*Eleocharis geniculata*)	1-25%	< 1% (Trace)

Appendix G
Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T3-2	Marsh Elder (*Iva frutescens*)	< 1% (Trace)	
T3-2	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	
T3-2	Nuttall's waterhemp (*Amaranthus tamarascina*)	1-25%	
T3-2	Saltgrass (*Distichlis spicata*)	26-50%	
T3-2	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	
T3-2	Smartweed (*Polygonum punctatum*)	< 1% (Trace)	
T3-2	Wire Grass (*Spartina patens*)	1-25%	76-99%
T3-3	Foxtail (*Setaria spp.*)	1-25%	
T3-3	Mallow (*Hibiscus spp.*)	< 1% (Trace)	
T3-3	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	
T3-3	Marsh Elder (*Iva frutescens*)	< 1% (Trace)	
T3-3	Nutsedge (*Cyperus spp.*)	1-25%	
T3-3	Oystergrass (*Spartina alterniflora*)	1-25%	76-99%
T3-3	Yellow Cowpea (*Vigna luteola*)	1-25%	
T3-4	Eleo Thick (*Eleocharis cellulosa*)	26-50%	
T3-4	Mallow (*Hibiscus spp.*)	26-50%	
T3-4	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	
T3-4	Saltgrass (*Distichlis spicata*)	1-25%	
T3-5	Camphor Weed (*Pluchea camphorata*)	< 1% (Trace)	< 1% (Trace)
T3-5	Coastal Waterhyssop (*Bacopa monnieri*)	1-25%	< 1% (Trace)
T3-5	Marsh Elder (*Iva frutescens*)	< 1% (Trace)	1-25%
T3-5	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	1-25%
T3-5	Olney Threesquare (*Scirpus americanus*)	51-75%	51-75%
T3-5	Oystergrass (*Spartina alterniflora*)	1-25%	
T3-5	Pink Ammania (*Ammania latifolia*)	< 1% (Trace)	
T3-5	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T3-5	Wire Grass (*Spartina patens*)	1-25%	1-25%
T3-6	Coastal Waterhyssop (*Bacopa monnieri*)	1-25%	76-99%
T3-6	Eleo Long (*Eleocharis rostellata*)	26-50%	
T3-6	Mallow (*Hibiscus spp.*)	< 1% (Trace)	< 1% (Trace)
T3-6	Marsh Aster (*Aster tenuifolius*)	1-25%	
T3-6	Marsh Elder (*Iva frutescens*)	< 1% (Trace)	< 1% (Trace)
T3-6	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	< 1% (Trace)
T3-6	Pink Ammania (*Ammania latifolia*)	< 1% (Trace)	1-25%
T3-6	Saltmarsh Fleabane (*Pluchea purpurascens*)	< 1% (Trace)	1-25%
T3-6	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T3-8	Coastal Waterhyssop (*Bacopa monnieri*)		26-50%
T3-8	Eleo Long (*Eleocharis rostellata*)	< 1% (Trace)	
T3-8	Foxtail (*Setaria spp.*)	1-25%	
T3-8	Mallow (*Hibiscus spp.*)	1-25%	
T3-8	Marsh Elder (*Iva frutescens*)		< 1% (Trace)
T3-8	Nutsedge (*Cyperus spp.*)	26-50%	< 1% (Trace)
T3-8	Oystergrass (*Spartina alterniflora*)	51-75%	51-75%
T3-8	Saltmarsh Fleabane (*Pluchea purpurascens*)		1-25%
T3-8	Saltmarsh Lythrum (*Lythrum lineare*)	1-25%	26-50%
T3-9	Eastern Baccharis (*Baccharis halimifolia*)	26-50%	
T3-9	Marsh Aster (*Aster tenuifolius*)	1-25%	
T3-9	Marsh Elder (*Iva frutescens*)	1-25%	1-25%
T3-9	Oystergrass (*Spartina alterniflora*)	51-75%	76-99%
T3-10	Knot grass (*Paspalum distichum*)	1-25%	
T3-10	Mallow (*Hibiscus spp.*)	< 1% (Trace)	

Appendix G
Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T3-10	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	
T3-10	Oystergrass (*Spartina alterniflora*)	51-75%	
T3-12	Eastern Baccharis (*Baccharis halimifolia*)		1-25%
T3-12	Knot grass (*Paspalum distichum*)	1-25%	1-25%
T3-12	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T3-12	Oystergrass (*Spartina alterniflora*)	26-50%	
T3-12	Saltgrass (*Distichlis spicata*)	26-50%	51-75%
T3-13	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T3-13	Oystergrass (*Spartina alterniflora*)	1-25%	1-25%
T3-13	Saltgrass (*Distichlis spicata*)	51-75%	76-99%
T3-13	Saltmarsh Lythrum (*Lythrum lineare*)	1-25%	
T3-15	Eastern Baccharis (*Baccharis halimifolia*)		< 1% (Trace)
T3-15	Marsh Aster (*Aster tenuifolius*)	1-25%	1-25%
T3-15	Oystergrass (*Spartina alterniflora*)	1-25%	1-25%
T3-15	Saltgrass (*Distichlis spicata*)	51-75%	76-99%
T4-1	Coastal Waterhyssop (*Bacopa monnieri*)	< 1% (Trace)	< 1% (Trace)
T4-1	Eleo Long (*Eleocharis rostellata*)	26-50%	< 1% (Trace)
T4-1	Mallow (*Hibiscus spp.*)		1-25%
T4-1	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T4-1	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	< 1% (Trace)
T4-1	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T4-1	Saltmarsh Fleabane (*Pluchea purpurascens*)		1-25%
T4-1	Wire Grass (*Spartina patens*)	26-50%	1-25%
T4-1	Yellow Cowpea (*Vigna luteola*)	1-25%	
T4-3	Bulltongue (*Sagittaria lancifolia*)	< 1% (Trace)	
T4-3	Marsh Aster (*Aster tenuifolius*)	1-25%	< 1% (Trace)
T4-3	Marsh Morning Glory (*Ipomoea sagittata*)		< 1% (Trace)
T4-3	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	
T4-3	Nuttall's waterhemp (*Amaranthus tamarascina*)	< 1% (Trace)	< 1% (Trace)
T4-3	Saltgrass (*Distichlis spicata*)	76-99%	26-50%
T4-3	Saltmarsh Lythrum (*Lythrum lineare*)	1-25%	
T4-3	Wire Grass (*Spartina patens*)	1-25%	
T4-4	Coastal Waterhyssop (*Bacopa monnieri*)	26-50%	
T4-4	Mallow (*Hibiscus spp.*)	< 1% (Trace)	< 1% (Trace)
T4-4	Marsh Aster (*Aster tenuifolius*)	1-25%	
T4-4	Marsh Elder (*Iva frutescens*)	1-25%	1-25%
T4-4	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T4-4	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	< 1% (Trace)
T4-4	Pink Ammania (*Ammania latifolia*)	< 1% (Trace)	
T4-4	Saltgrass (*Distichlis spicata*)	< 1% (Trace)	< 1% (Trace)
T4-4	Saltmarsh Fleabane (*Pluchea purpurascens*)	< 1% (Trace)	
T4-4	Saltmarsh Lythrum (*Lythrum lineare*)		< 1% (Trace)
T4-4	Wire Grass (*Spartina patens*)	26-50%	1-25%
T4-6	Eastern Baccharis (*Baccharis halimifolia*)		1-25%
T4-6	Marsh Aster (*Aster tenuifolius*)	1-25%	
T4-6	Oystergrass (*Spartina alterniflora*)	76-99%	76-99%
T4-6	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T4-8	Coastal Waterhyssop (*Bacopa monnieri*)	< 1% (Trace)	
T4-8	Knot grass (*Paspalum distichum*)	1-25%	1-25%
T4-8	Mallow (*Hibiscus spp.*)		1-25%
T4-8	Marsh Aster (*Aster tenuifolius*)	1-25%	< 1% (Trace)

Appendix G
Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T4-8	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T4-8	Nutsedge (*Cyperus spp.*)		< 1% (Trace)
T4-8	Oystergrass (*Spartina alterniflora*)	51-75%	26-50%
T4-8	Saltgrass (*Distichlis spicata*)	26-50%	26-50%
T4-8	Saltmarsh Fleabane (*Pluchea purpurascens*)	< 1% (Trace)	
T4-8	Saltmarsh Lythrum (*Lythrum lineare*)	1-25%	< 1% (Trace)
T4-8	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	< 1% (Trace)
T4-10	Eleo Thick (*Eleocharis cellulosa*)	< 1% (Trace)	1-25%
T4-10	Knot grass (*Paspalum distichum*)	1-25%	1-25%
T4-10	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T4-10	Saltgrass (*Distichlis spicata*)	76-99%	76-99%
T4-13	Eastern Baccharis (*Baccharis halimifolia*)	76-99%	51-75%
T4-13	Foxtail (*Setaria spp.*)		< 1% (Trace)
T4-13	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T4-13	Saltgrass (*Distichlis spicata*)	26-50%	26-50%
T4-16	Oystergrass (*Spartina alterniflora*)	51-75%	76-99%
T4-16	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T4-16	Wire Grass (*Spartina patens*)	1-25%	1-25%
T4-18	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T4-18	Oystergrass (*Spartina alterniflora*)	26-50%	1-25%
T4-18	Saltgrass (*Distichlis spicata*)	1-25%	26-50%
T4-18	Wire Grass (*Spartina patens*)	26-50%	1-25%
T4-21	Eastern Baccharis (*Baccharis halimifolia*)		26-50%
T4-21	Marsh Aster (*Aster tenuifolius*)	1-25%	1-25%
T4-21	Oystergrass (*Spartina alterniflora*)	51-75%	26-50%
T4-21	Saltgrass (*Distichlis spicata*)	26-50%	26-50%
T4-21	Wire Grass (*Spartina patens*)	1-25%	1-25%
T4-22	Oystergrass (*Spartina alterniflora*)	26-50%	26-50%
T4-22	Saltgrass (*Distichlis spicata*)	26-50%	26-50%
T4-22	Wire Grass (*Spartina patens*)	1-25%	1-25%
T4-24	Oystergrass (*Spartina alterniflora*)	76-99%	76-99%
T4-24	Saltgrass (*Distichlis spicata*)	< 1% (Trace)	< 1% (Trace)
T4-24	Wire Grass (*Spartina patens*)	26-50%	26-50%
T5-1	Eleo Low (*Eleocharis geniculata*)	< 1% (Trace)	< 1% (Trace)
T5-1	Marsh Aster (*Aster tenuifolius*)		< 1% (Trace)
T5-1	Marsh Morning Glory (*Ipomoea sagittata*)		< 1% (Trace)
T5-1	Nutsedge (*Cyperus spp.*)	1-25%	
T5-1	Olney Threesquare (*Scirpus americanus*)	< 1% (Trace)	1-25%
T5-1	Pink Ammania (*Ammania latifolia*)	1-25%	
T5-1	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	1-25%
T5-1	Wire Grass (*Spartina patens*)	26-50%	
T5-3	Eastern Baccharis (*Baccharis halimifolia*)	< 1% (Trace)	
T5-3	Eleo Low (*Eleocharis geniculata*)	1-25%	1-25%
T5-3	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	
T5-3	Saltgrass (*Distichlis spicata*)	1-25%	< 1% (Trace)
T5-3	Wire Grass (*Spartina patens*)	51-75%	26-50%
T5-4	Eastern Baccharis (*Baccharis halimifolia*)	< 1% (Trace)	< 1% (Trace)
T5-4	Goldenrod (*Solidago spp.*)	< 1% (Trace)	
T5-4	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	1-25%
T5-4	Oystergrass (*Spartina alterniflora*)	26-50%	< 1% (Trace)
T5-4	Saltgrass (*Distichlis spicata*)	1-25%	1-25%

Appendix G
Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T5-4	Saltmarsh Lythrum (*Lythrum lineare*)		1-25%
T5-5	Bristlegrass (*Setaria geniculata*)	< 1% (Trace)	
T5-5	Eastern Baccharis (*Baccharis halimifolia*)	< 1% (Trace)	< 1% (Trace)
T5-5	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	
T5-5	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T5-5	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T5-5	Wire Grass (*Spartina patens*)	51-75%	76-99%
T5-5	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	1-25%
T5-6	Marsh Aster (*Aster tenuifolius*)		< 1% (Trace)
T5-6	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	1-25%
T5-6	Wire Grass (*Spartina patens*)	1-25%	26-50%
T5-6	Yellow Cowpea (*Vigna luteola*)	1-25%	< 1% (Trace)
T5-7	Marsh Aster (*Aster tenuifolius*)	1-25%	< 1% (Trace)
T5-7	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	
T5-7	Saltmarsh Lythrum (*Lythrum lineare*)		< 1% (Trace)
T5-7	Wire Grass (*Spartina patens*)	51-75%	76-99%
T5-7	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	1-25%
T5-9	Marsh Aster (*Aster tenuifolius*)	1-25%	
T5-9	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T5-9	Pink Ammania (*Ammania latifolia*)		< 1% (Trace)
T5-9	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T5-9	Wire Grass (*Spartina patens*)	76-99%	51-75%
T5-9	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	
T5-12	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T5-12	Wire Grass (*Spartina patens*)	1-25%	26-50%
T5-13	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T5-13	Nutsedge (*Cyperus spp.*)	26-50%	
T5-13	Olney Threesquare (*Scirpus americanus*)	51-75%	51-75%
T5-13	Oystergrass (*Spartina alterniflora*)	1-25%	1-25%
T5-13	Saltgrass (*Distichlis spicata*)	26-50%	1-25%
T5-15	Black Needle Rush (*Juncus roemerianus*)	51-75%	51-75%
T5-15	Marsh Aster (*Aster tenuifolius*)		1-25%
T5-15	Marsh Morning Glory (*Ipomoea sagittata*)	26-50%	26-50%
T5-15	Wire Grass (*Spartina patens*)	< 1% (Trace)	
T5-15	Yellow Cowpea (*Vigna luteola*)	26-50%	
T5-16	Black Needle Rush (*Juncus roemerianus*)	1-25%	26-50%
T5-16	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	1-25%
T5-16	Wire Grass (*Spartina patens*)	26-50%	1-25%
T5-16	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T5-17	Black Needle Rush (*Juncus roemerianus*)	26-50%	1-25%
T5-17	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T5-17	Nutsedge (*Cyperus spp.*)		< 1% (Trace)
T5-17	Pink Ammania (*Ammania latifolia*)		< 1% (Trace)
T5-17	Saltgrass (*Distichlis spicata*)	51-75%	51-75%
T5-17	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T5-17	Wire Grass (*Spartina patens*)	26-50%	26-50%
T5-17	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T5-18	Marsh Aster (*Aster tenuifolius*)	1-25%	1-25%
T5-18	Olney Threesquare (*Scirpus americanus*)	1-25%	< 1% (Trace)
T5-18	Saltgrass (*Distichlis spicata*)	26-50%	26-50%
T5-18	Wire Grass (*Spartina patens*)	51-75%	

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Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T8-1	Bulltongue (*Sagittaria lancifolia*)	26-50%	1-25%
T8-1	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T8-1	Smartweed (*Polygonum punctatum*)	1-25%	26-50%
T8-1	Wire Grass (*Spartina patens*)	76-99%	76-99%
T8-1	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T8-2	Bristlegrass (*Setaria geniculata*)	26-50%	1-25%
T8-2	Bulltongue (*Sagittaria lancifolia*)	1-25%	
T8-2	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T8-2	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T8-2	Nutsedge (*Cyperus spp.*)	1-25%	
T8-2	Saltmarsh Lythrum (*Lythrum lineare*)	1-25%	1-25%
T8-2	Smartweed (*Polygonum punctatum*)	< 1% (Trace)	< 1% (Trace)
T8-2	Wire Grass (*Spartina patens*)	51-75%	51-75%
T8-2	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T8-3	Alligatorweed (*Alternanthera philoxeroides*)		< 1% (Trace)
T8-3	Bristlegrass (*Setaria geniculata*)		1-25%
T8-3	Coastal Waterhyssop (*Bacopa monnieri*)	< 1% (Trace)	
T8-3	Eleo Long (*Eleocharis rostellata*)	26-50%	26-50%
T8-3	Marsh Morning Glory (*Ipomoea sagittata*)		< 1% (Trace)
T8-3	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	
T8-3	Olney Threesquare (*Scirpus americanus*)	26-50%	51-75%
T8-3	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T8-3	Wire Grass (*Spartina patens*)	51-75%	51-75%
T8-4	Eleo Long (*Eleocharis rostellata*)	1-25%	1-25%
T8-4	Marsh Aster (*Aster tenuifolius*)		< 1% (Trace)
T8-4	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	
T8-4	Olney Threesquare (*Scirpus americanus*)	51-75%	51-75%
T8-4	Saltmarsh Lythrum (*Lythrum lineare*)		1-25%
T8-4	Wire Grass (*Spartina patens*)	51-75%	51-75%
T8-7	Alligatorweed (*Alternanthera philoxeroides*)		1-25%
T8-7	Eastern Baccharis (*Baccharis halimifolia*)		26-50%
T8-7	Eleo Long (*Eleocharis rostellata*)	< 1% (Trace)	1-25%
T8-7	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T8-7	Olney Threesquare (*Scirpus americanus*)	1-25%	1-25%
T8-7	Saltgrass (*Distichlis spicata*)		1-25%
T8-7	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	
T8-7	Wire Grass (*Spartina patens*)	76-99%	51-75%
T8-11	Alligatorweed (*Alternanthera philoxeroides*)		< 1% (Trace)
T8-11	Bagscale (*Sacciolepis striata*)	< 1% (Trace)	< 1% (Trace)
T8-11	Bulltongue (*Sagittaria lancifolia*)	76-99%	76-99%
T8-11	Marsh Aster (*Aster tenuifolius*)		< 1% (Trace)
T8-11	Oystergrass (*Spartina alterniflora*)	< 1% (Trace)	< 1% (Trace)
T8-11	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T8-11	Wire Grass (*Spartina patens*)	1-25%	1-25%
T8-12	Bulltongue (*Sagittaria lancifolia*)	1-25%	1-25%
T8-12	Eastern Baccharis (*Baccharis halimifolia*)	< 1% (Trace)	
T8-12	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	
T8-12	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T8-12	Smartweed (*Polygonum punctatum*)	< 1% (Trace)	
T8-12	Unidentified Flora (*Unidentified flora*)		< 1% (Trace)
T8-12	Wire Grass (*Spartina patens*)	51-75%	26-50%

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Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T8-12	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	< 1% (Trace)
T9-1	Eleo Long (*Eleocharis rostellata*)		26-50%
T9-1	Oystergrass (*Spartina alterniflora*)		1-25%
T9-1	Wire Grass (*Spartina patens*)	76-99%	26-50%
T9-1	Yellow Cowpea (*Vigna luteola*)	26-50%	1-25%
T9-2	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T9-2	Wire Grass (*Spartina patens*)	76-99%	76-99%
T9-2	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T9-3	Coastal Waterhyssop (*Bacopa monnieri*)	< 1% (Trace)	
T9-3	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	
T9-3	Olney Threesquare (*Scirpus americanus*)	76-99%	76-99%
T9-3	Wire Grass (*Spartina patens*)	26-50%	1-25%
T9-4	Olney Threesquare (*Scirpus americanus*)	51-75%	76-99%
T9-4	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T9-4	Wire Grass (*Spartina patens*)	51-75%	51-75%
T9-5	Bulltongue (*Sagittaria lancifolia*)	1-25%	
T9-5	Eleo Long (*Eleocharis rostellata*)	1-25%	1-25%
T9-5	Marsh Morning Glory (*Ipomoea sagittata*)		1-25%
T9-5	Wire Grass (*Spartina patens*)	51-75%	51-75%
T9-5	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	< 1% (Trace)
T9-6	Alligatorweed (*Alternanthera philoxeroides*)	< 1% (Trace)	< 1% (Trace)
T9-6	Eleo Long (*Eleocharis rostellata*)	1-25%	< 1% (Trace)
T9-6	Olney Threesquare (*Scirpus americanus*)	1-25%	
T9-6	Pennywort (*Hydrocotyle spp.*)	< 1% (Trace)	< 1% (Trace)
T9-6	Wire Grass (*Spartina patens*)	76-99%	26-50%
T9-7	Bulltongue (*Sagittaria lancifolia*)	1-25%	1-25%
T9-7	Olney Threesquare (*Scirpus americanus*)	51-75%	76-99%
T9-7	Oystergrass (*Spartina alterniflora*)	< 1% (Trace)	
T9-7	Smartweed (*Polygonum punctatum*)	26-50%	
T9-7	Yellow Cowpea (*Vigna luteola*)	1-25%	
T9-8	Black Needle Rush (*Juncus roemerianus*)		1-25%
T9-8	Eastern Baccharis (*Baccharis halimifolia*)		< 1% (Trace)
T9-8	Eleo Long (*Eleocharis rostellata*)	1-25%	1-25%
T9-8	Goldenrod (*Solidago spp.*)	< 1% (Trace)	
T9-8	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T9-8	Olney Threesquare (*Scirpus americanus*)		1-25%
T9-8	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T9-8	Wire Grass (*Spartina patens*)	26-50%	26-50%
T9-8	Yellow Cowpea (*Vigna luteola*)	1-25%	26-50%
T9-9	Eastern Baccharis (*Baccharis halimifolia*)		< 1% (Trace)
T9-9	Eleo Long (*Eleocharis rostellata*)	< 1% (Trace)	1-25%
T9-9	Foxtail (*Setaria spp.*)	1-25%	
T9-9	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T9-9	Saltgrass (*Distichlis spicata*)	1-25%	1-25%
T9-9	Saltmarsh Lythrum (*Lythrum lineare*)	1-25%	
T9-9	Smartweed (*Polygonum punctatum*)		26-50%
T9-9	Wire Grass (*Spartina patens*)	76-99%	51-75%
T9-9	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T9-11	Black Needle Rush (*Juncus roemerianus*)	1-25%	51-75%
T9-11	Bulltongue (*Sagittaria lancifolia*)		1-25%
T9-11	Eastern Baccharis (*Baccharis halimifolia*)	< 1% (Trace)	

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Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T9-11	Eleo Long (*Eleocharis rostellata*)	< 1% (Trace)	
T9-11	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	< 1% (Trace)
T9-11	Olney Threesquare (*Scirpus americanus*)	1-25%	
T9-11	Saltmarsh Mallow (*Kosteletzkya virginica*)	< 1% (Trace)	
T9-11	Smartweed (*Polygonum punctatum*)	26-50%	
T9-11	Wire Grass (*Spartina patens*)	26-50%	26-50%
T9-11	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T9-12	Eleo Long (*Eleocharis rostellata*)	< 1% (Trace)	
T9-12	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T9-12	Saltmarsh Lythrum (*Lythrum lineare*)	1-25%	1-25%
T9-12	Wire Grass (*Spartina patens*)	51-75%	76-99%
T9-12	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T9-13	Bulltongue (*Sagittaria lancifolia*)	1-25%	
T9-13	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	1-25%
T9-13	Wire Grass (*Spartina patens*)	76-99%	76-99%
T9-13	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T9-14	Foxtail (*Setaria spp.*)	< 1% (Trace)	
T9-14	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T9-14	Wire Grass (*Spartina patens*)	76-99%	51-75%
T9-14	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T10-1	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T10-1	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T10-1	Wire Grass (*Spartina patens*)	76-99%	76-99%
T10-1	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T10-10	Bristlegrass (*Setaria geniculata*)	1-25%	
T10-10	Bulltongue (*Sagittaria lancifolia*)	< 1% (Trace)	
T10-10	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T10-10	Wire Grass (*Spartina patens*)	76-99%	76-99%
T10-10	Yellow Cowpea (*Vigna luteola*)		< 1% (Trace)
T10-11	Dye Bedstraw (*Galium tinctorium*)	< 1% (Trace)	1-25%
T10-11	Eleo Long (*Eleocharis rostellata*)	26-50%	1-25%
T10-11	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T10-11	Olney Threesquare (*Scirpus americanus*)	< 1% (Trace)	
T10-11	Saltmarsh Lythrum (*Lythrum lineare*)	1-25%	
T10-11	Smartweed (*Polygonum punctatum*)	1-25%	
T10-11	Wire Grass (*Spartina patens*)	76-99%	76-99%
T10-11	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T10-12	Alligatorweed (*Alternanthera philoxeroides*)	< 1% (Trace)	
T10-12	Bulltongue (*Sagittaria lancifolia*)	26-50%	26-50%
T10-12	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T10-12	Narrow leaf Cattail (*Typha latifolia*)		< 1% (Trace)
T10-12	Smartweed (*Polygonum punctatum*)	1-25%	1-25%
T10-12	Wire Grass (*Spartina patens*)	51-75%	26-50%
T10-12	Yellow Cowpea (*Vigna luteola*)		1-25%
T10-13	Bulltongue (*Sagittaria lancifolia*)	1-25%	< 1% (Trace)
T10-13	Eleo Long (*Eleocharis rostellata*)	26-50%	26-50%

Appendix G
Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T12-2	Saltmarsh Lythrum (*Lythrum lineare*)	1-25%	1-25%
T12-2	Smartweed (*Polygonum punctatum*)		26-50%
T12-2	Wire Grass (*Spartina patens*)	51-75%	51-75%
T12-2	Yellow Cowpea (*Vigna luteola*)	1-25%	
T12-3	Marsh Morning Glory (*Ipomoea sagittata*)		< 1% (Trace)
T12-3	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	< 1% (Trace)
T12-3	Nuttall's waterhemp (*Amaranthus tamarascina*)	< 1% (Trace)	
T12-3	Olney Threesquare (*Scirpus americanus*)	76-99%	76-99%
T12-3	Pink Ammania (*Ammania latifolia*)		< 1% (Trace)
T12-3	Wire Grass (*Spartina patens*)		1-25%
T12-3	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T12-4	Bristlegrass (*Setaria geniculata*)	< 1% (Trace)	
T12-4	Coastal Waterhyssop (*Bacopa monnieri*)	< 1% (Trace)	
T12-4	Eleo Low (*Eleocharis geniculata*)	76-99%	
T12-4	Nutsedge (*Cyperus spp.*)	1-25%	
T12-4	Saltmarsh Lythrum (*Lythrum lineare*)	26-50%	
T12-4	Wire Grass (*Spartina patens*)	1-25%	76-99%
T12-5	Bristlegrass (*Setaria geniculata*)		< 1% (Trace)
T12-5	Bulltongue (*Sagittaria lancifolia*)	26-50%	
T12-5	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T12-5	Smartweed (*Polygonum punctatum*)	1-25%	
T12-5	Wire Grass (*Spartina patens*)	76-99%	76-99%
T12-5	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T12-6	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T12-6	Wire Grass (*Spartina patens*)	76-99%	76-99%
T12-6	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	1-25%
T12-7	Coastal Waterhyssop (*Bacopa monnieri*)		26-50%
T12-7	Eleo Low (*Eleocharis geniculata*)	1-25%	1-25%
T12-7	Olney Threesquare (*Scirpus americanus*)	1-25%	26-50%
T12-7	Pink Ammania (*Ammania latifolia*)		< 1% (Trace)
T12-7	Wire Grass (*Spartina patens*)	76-99%	51-75%
T12-8	Camphor Weed (*Pluchea camphorata*)	1-25%	
T12-8	Coastal Waterhyssop (*Bacopa monnieri*)	1-25%	1-25%
T12-8	Dye Bedstraw (*Galium tinctorium*)	< 1% (Trace)	< 1% (Trace)
T12-8	Marsh Aster (*Aster tenuifolius*)		< 1% (Trace)
T12-8	Marsh Morning Glory (*Ipomoea sagittata*)		1-25%
T12-8	Smartweed (*Polygonum punctatum*)	51-75%	26-50%
T12-8	Wire Grass (*Spartina patens*)	51-75%	76-99%
T12-8	Yellow Cowpea (*Vigna luteola*)	1-25%	26-50%
T12-9	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	
T12-9	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	
T12-9	Nutsedge (*Cyperus spp.*)		< 1% (Trace)
T12-9	Nuttall's waterhemp (*Amaranthus tamarascina*)		< 1% (Trace)
T12-9	Olney Threesquare (*Scirpus americanus*)	51-75%	51-75%

Appendix G
Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T12-9	Wire Grass (*Spartina patens*)	51-75%	51-75%
T12-9	Yellow Cowpea (*Vigna luteola*)	26-50%	1-25%
T12-10	Alligatorweed (*Alternanthera philoxeroides*)		< 1% (Trace)
T12-10	Bagscale (*Sacciolepis striata*)	< 1% (Trace)	
T12-10	Bulltongue (*Sagittaria lancifolia*)	26-50%	
T12-10	Camphor Weed (*Pluchea camphorata*)		1-25%
T12-10	Nuttall's waterhemp (*Amaranthus tamarascina*)		< 1% (Trace)
T12-10	Olney Threesquare (*Scirpus americanus*)	26-50%	76-99%
T12-10	Smartweed (*Polygonum punctatum*)	1-25%	1-25%

Appendix G
Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T11-1	Olney Threesquare (*Scirpus americanus*)	76-99%	76-99%
T11-1	Saltmarsh Fleabane (*Pluchea purpurascens*)	< 1% (Trace)	
T11-1	Wire Grass (*Spartina patens*)	26-50%	26-50%
T11-1	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	
T11-2	Bristlegrass (*Setaria geniculata*)	1-25%	1-25%
T11-2	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	< 1% (Trace)
T11-2	Wire Grass (*Spartina patens*)	76-99%	76-99%
T11-2	Yellow Cowpea (*Vigna luteola*)	26-50%	26-50%
T11-4	Foxtail (*Setaria spp.*)	< 1% (Trace)	
T11-4	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T11-4	Saltmarsh Lythrum (*Lythrum lineare*)		< 1% (Trace)
T11-4	Smartweed (*Polygonum punctatum*)	1-25%	1-25%
T11-4	Wire Grass (*Spartina patens*)	76-99%	76-99%
T11-4	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	< 1% (Trace)
T11-5	Black Needle Rush (*Juncus roemerianus*)	76-99%	1-25%
T11-5	Bulltongue (*Sagittaria lancifolia*)		< 1% (Trace)
T11-5	Coastal Waterhyssop (*Bacopa monnieri*)	< 1% (Trace)	
T11-5	Eleo Long (*Eleocharis rostellata*)	1-25%	< 1% (Trace)
T11-5	Nutsedge (*Cyperus spp.*)		< 1% (Trace)
T11-5	Pennywort (*Hydrocotyle spp.*)	< 1% (Trace)	
T11-5	Pink Ammania (*Ammania latifolia*)		< 1% (Trace)
T11-5	Wire Grass (*Spartina patens*)	26-50%	51-75%
T11-6	Foxtail (*Setaria spp.*)	< 1% (Trace)	
T11-6	Marsh Elder (*Iva frutescens*)	< 1% (Trace)	
T11-6	Nutsedge (*Cyperus spp.*)	< 1% (Trace)	< 1% (Trace)
T11-6	Olney Threesquare (*Scirpus americanus*)	76-99%	26-50%
T11-6	Wire Grass (*Spartina patens*)	26-50%	26-50%
T11-6	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T11-7	Bulltongue (*Sagittaria lancifolia*)	< 1% (Trace)	
T11-7	Coastal Waterhyssop (*Bacopa monnieri*)		< 1% (Trace)
T11-7	Goldenrod (*Solidago spp.*)	< 1% (Trace)	
T11-7	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T11-7	Olney Threesquare (*Scirpus americanus*)	26-50%	1-25%
T11-7	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	< 1% (Trace)
T11-7	Smartweed (*Polygonum punctatum*)		1-25%
T11-7	Wire Grass (*Spartina patens*)	76-99%	76-99%
T11-8	Bulltongue (*Sagittaria lancifolia*)		< 1% (Trace)
T11-8	Eleo Long (*Eleocharis rostellata*)		1-25%
T11-8	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T11-8	Olney Threesquare (*Scirpus americanus*)	76-99%	76-99%
T11-8	Wire Grass (*Spartina patens*)	26-50%	1-25%
T11-8	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	< 1% (Trace)
T11-9	Foxtail (*Setaria spp.*)	< 1% (Trace)	< 1% (Trace)
T11-9	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)

Appendix G
Clovelly Radial Transects
Vegetative Cover Results from 2001

Transect Point	Common Name (*Scientific Name*)	Clovelly Cover Rank (Left)	Clovelly Cover Rank (Right)
T11-9	Olney Threesquare (*Scirpus americanus*)	26-50%	1-25%
T11-9	Saltmarsh Lythrum (*Lythrum lineare*)		< 1% (Trace)
T11-9	Wire Grass (*Spartina patens*)	76-99%	76-99%
T11-9	Yellow Cowpea (*Vigna luteola*)	1-25%	
T11-10	Eleo Long (*Eleocharis rostellata*)	1-25%	1-25%
T11-10	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T11-10	Olney Threesquare (*Scirpus americanus*)	< 1% (Trace)	1-25%
T11-10	Saltmarsh Lythrum (*Lythrum lineare*)	< 1% (Trace)	
T11-10	Wire Grass (*Spartina patens*)	76-99%	76-99%
T11-10	Yellow Cowpea (*Vigna luteola*)		< 1% (Trace)
T11-11	Bulltongue (*Sagittaria lancifolia*)	1-25%	26-50%
T11-11	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	< 1% (Trace)
T11-11	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	< 1% (Trace)
T11-11	Nuttall's waterhemp (*Amaranthus tamarascina*)	< 1% (Trace)	< 1% (Trace)
T11-11	Smartweed (*Polygonum punctatum*)	< 1% (Trace)	
T11-11	Wire Grass (*Spartina patens*)	76-99%	76-99%
T11-11	Yellow Cowpea (*Vigna luteola*)	< 1% (Trace)	< 1% (Trace)
T11-12	Bagscale (*Sacciolepis striata*)	< 1% (Trace)	
T11-12	Bulltongue (*Sagittaria lancifolia*)	< 1% (Trace)	
T11-12	Eleo Long (*Eleocharis rostellata*)	1-25%	
T11-12	Foxtail (*Setaria spp.*)	< 1% (Trace)	
T11-12	Marsh Morning Glory (*Ipomoea sagittata*)	< 1% (Trace)	< 1% (Trace)
T11-12	Olney Threesquare (*Scirpus americanus*)	1-25%	26-50%
T11-12	Smartweed (*Polygonum punctatum*)		1-25%
T11-12	Wire Grass (*Spartina patens*)	51-75%	51-75%
T11-12	Yellow Cowpea (*Vigna luteola*)	1-25%	< 1% (Trace)
T11-13	Eleo Long (*Eleocharis rostellata*)	1-25%	1-25%
T11-13	Nutsedge (*Cyperus spp.*)	1-25%	1-25%
T11-13	Nuttall's waterhemp (*Amaranthus tamarascina*)		< 1% (Trace)
T11-13	Olney Threesquare (*Scirpus americanus*)	51-75%	26-50%
T11-13	Pink Ammania (*Ammania latifolia*)	< 1% (Trace)	
T11-13	Wire Grass (*Spartina patens*)	26-50%	26-50%
T11-14	Alligatorweed (*Alternanthera philoxeroides*)	< 1% (Trace)	< 1% (Trace)
T11-14	Bulltongue (*Sagittaria lancifolia*)	26-50%	
T11-14	Eleo Long (*Eleocharis rostellata*)	1-25%	1-25%
T11-14	Marsh Aster (*Aster tenuifolius*)	< 1% (Trace)	1-25%
T11-14	Smartweed (*Polygonum punctatum*)		1-25%
T11-14	Wire Grass (*Spartina patens*)	26-50%	51-75%
T11-14	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T12-1	Dye Bedstraw (*Galium tinctorium*)	< 1% (Trace)	< 1% (Trace)
T12-1	Marsh Morning Glory (*Ipomoea sagittata*)	1-25%	1-25%
T12-1	Wire Grass (*Spartina patens*)	76-99%	76-99%
T12-1	Yellow Cowpea (*Vigna luteola*)	1-25%	1-25%
T12-2	Marsh Morning Glory (*Ipomoea sagittata*)		< 1% (Trace)

Appendix H
Clovelly Radial Transects
Analytical Results of Sediment Samples

Transect	Position	Chloride (Cl^-) (mg/L)	Salinity (mg/L)
1	1	1,920	3,469
1	2	1,443	2,606
1	3	NS	NS
1	4	1,661	3,000
1	5	1,527	2,759
1	6	1,457	2,633
1	7	NS	NS
2	1	2,396	4,329
2	2	1,422	2,569
2	3	1,164	2,103
2	4	372	671
2	5	1,420	2,566
2	6	NS	NS
2	7	642	1,160
2	8	1,472	2,660
2	9	1,740	3,143
2	10	5,402	9,758
2	11	1,200	2,169
3	1	2,206	3,985
3	2	1,080	1,952
3	3	586	1,060
3	4	3,622	6,544
3	5	1,161	2,098
3	6	1,288	2,327
3	7	NS	NS
3	8	1,763	3,186
3	9	3,670	6,631
3	10	4,879	8,814
3	11	NS	NS
3	12	1,976	3,570
3	13	1,137	2,054
3	15 ?	1,607	2,904
4	1	498	900
4	2	NS	NS
4	3	1,706	3,081
4	4	1,433	2,588
4	5	NS	NS
4	6	2,938	5,307
4	7	NS	NS

Appendix H
Clovelly Radial Transects
Analytical Results of Sediment Samples

Transect	Position	Chloride (Cl^-) (mg/L)	Salinity (mg/L)
4	8	787	1,422
4	9	NS	NS
4	10	1,147	2,072
4	11	NS	NS
4	12	NS	NS
4	13	2,268	4,098
4	14	NS	NS
4	15	NS	NS
4	16	1,715	3,099
4	17	NS	NS
4	18	1,714	3,096
4	19	NS	NS
4	20	NS	NS
4	21	1,497	2,705
4	22	2,102	3,798
4	23	NS	NS
4	24	7,724	13,953
5	1	584	1,056
5	2	NS	NS
5	3	1,610	2,909
5	4	1,267	2,289
5	5	1,961	3,542
5	6	1,022	1,846
5	7	1,579	2,853
5	8	NS	NS
5	9	1,121	2,025
5	10	NS	NS
5	11	NS	NS
5	12	823	1,486
5	13	1,326	2,396
5	14	NS	NS
5	15	5,146	9,297
5	16	2,116	3,822
5	17	932	1,684
5	18	1,638	2,960
5	19	2,363	4,269
5	20	NS	NS
6	1	1,279	2,311
6	2	NS	NS

Appendix H
Clovelly Radial Transects
Analytical Results of Sediment Samples

Transect	Position	Chloride (Cl^-) (mg/L)	Salinity (mg/L)
6	3	994	1,796
6	4	1,883	3,402
6	5	1,001	1,808
6	6	3,547	6,407
6	7	2,838	5,128
6	8	1,455	2,629
6	9	2,550	4,607
6	10	2,642	4,773
7	1	1,254	2,266
7	2	824	1,489
7	3	1,121	2,024
7	4	1,334	2,410
7	5	NS	NS
7	6	NS	NS
7	7	NS	NS
7	8	1,487	2,686
7	9	2,751	4,971
8	1	821	1,483
8	2	1,608	2,906
8	3	2,128	3,845
8	4	1,802	3,255
8	5	NS	NS
8	6	NS	NS
8	7	1,089	1,968
8	8	NS	NS
8	9	NS	NS
8	10	NS	NS
8	11	998	1,803
8	12	970	1,753
9	1	1,708	3,085
9	2	3,318	5,993
9	3	1,639	2,962
9	4	922	1,666
9	5	1,973	3,565
9	6	2,236	4,039
9	7	1,376	2,487
9	8	2,935	5,302
9	9	2,060	3,722
9	10	NS	NS

Appendix H
Clovelly Radial Transects
Analytical Results of Sediment Samples

Transect	Position	Chloride (Cl^-) (mg/L)	Salinity (mg/L)
9	11	3,302	5,966
9	12	814	1,470
9	13	3,271	5,909
9	14	2,426	4,383
10	1	2,689	4,857
10	2	1,322	2,389
10	3	2,934	5,301
10	4	1,559	2,816
10	5	2,513	4,540
10	6	2,040	3,684
10	7	3,797	6,859
10	8	1,970	3,559
10	9	1,696	3,064
10	10	3,192	5,766
10	11	1,505	2,718
10	12	1,072	1,937
10	13	1,993	3,600
10	14	952	1,721
10	15	720	1,302
10	16	1,615	2,917
10	17	1,146	2,070
11	1	1,099	1,985
11	2	1,301	2,350
11	3	NS	NS
11	4	1,952	3,526
11	5	3,688	6,662
11	6	1,851	3,344
11	7	2,508	4,530
11	8	1,583	2,859
11	9	1,690	3,053
11	10	2,552	4,610
11	11	1,499	2,708
11	12	1,270	2,294
11	13	1,419	2,564
11	14	822	1,485
12	1	1,542	2,786
12	2	1,009	1,822
12	3	1,481	2,676
12	4	2,005	3,622

Appendix H
Clovelly Radial Transects
Analytical Results of Sediment Samples

Transect	Position	Chloride (Cl^-) (mg/L)	Salinity (mg/L)
12	5	1,777	3,211
12	6	1,634	2,953
12	7	503	908
12	8	1,168	2,110
12	9	1,256	2,269
12	10	776	1,402

NS = No sample taken

Appendix I
Wading Birds and Pelicans
Number of Birds per Transect and per Marsh Type
Observed in 2001

Location		Common Name	Scientific Name	Marsh Type		
				Saline	Brackish	Fresh/ Intermediate
West Control	West Observations	White Ibis	*Eudocimus albus*	255		5
		White Pelican	*Pelecanus erythrorhynchos*	100		
		Great Egret	*Casmerodius albus*	23	1	6
		Snowy Egret	*Egretta thula*	14		10
		Dark Ibis	*Plegardis talcinellus*	2		
		Great Blue Heron	*Ardea herodias*	7		
		Little Blue Heron	*Egretta caerulea*	8		21
		Tricolored Heron	*Egretta tricolor*	9	1	
		Brown Pelican	*Pelecanus occidentalis*	3		
		Black-crowned Night Heron	*Nycticorax nycticorax*			
		Green Heron	*Butorides virescens*			
		Anhinga	*Anhinga anhinga*			
		Double-crested Cormorant	*Phalacrocorax auritus*	1	5	
		Green -backed Heron	*Butorides striatus*			
		Roseate Spoonbill	*Ajaia ajaja*	15		
	East Observations	White Ibis	*Eudocimus albus*	172		4
		White Pelican	*Pelecanus erythrorhynchos*	84		
		Great Egret	*Casmerodius albus*	60	2	9
		Snowy Egret	*Egretta thula*	28	1	4
		Dark Ibis	*Plegardis talcinellus*			
		Great Blue Heron	*Ardea herodias*	19	1	1
		Little Blue Heron	*Egretta caerulea*	14	2	
		Tricolored Heron	*Egretta tricolor*	17		4
		Brown Pelican	*Pelecanus occidentalis*			
		Black-crowned Night Heron	*Nycticorax nycticorax*	1		
		Green Heron	*Butorides virescens*			
		Anhinga	*Anhinga anhinga*			2
		Double-crested Cormorant	*Phalacrocorax auritus*	36	9	1
		Green -backed Heron	*Butorides striatus*	2		
		Roseate Spoonbill	*Ajaia ajaja*	23		
	Totals			**893**	**22**	**67**

Appendix I
Wading Birds and Pelicans
Number of Birds per Transect and per Marsh Type
Observed in 2001

Location		Common Name	Scientific Name	Marsh Type		
				Saline	Brackish	Fresh/ Intermediate
East Control	West Observations	White Ibis	*Eudocimus albus*	11		
		White Pelican	*Pelecanus erythrorhynchos*	38		1
		Great Egret	*Casmerodius albus*	23	5	5
		Snowy Egret	*Egretta thula*	4		1
		Dark Ibis	*Plegardis talcinellus*			
		Great Blue Heron	*Ardea herodias*	13	1	3
		Little Blue Heron	*Egretta caerulea*	2		
		Tricolored Heron	*Egretta tricolor*	5		1
		Brown Pelican	*Pelecanus occidentalis*			
		Black-crowned Night Heron	*Nycticorax nycticorax*			
		Green Heron	*Butorides virescens*			
		Anhinga	*Anhinga anhinga*			2
		Double-crested Cormorant	*Phalacrocorax auritus*	25	2	56
		Green-backed Heron	*Butorides striatus*			
		Roseate Spoonbill	*Ajaia ajaja*			
	East Observations	White Ibis	*Eudocimus albus*	12		
		White Pelican	*Pelecanus erythrorhynchos*	2	45	
		Great Egret	*Casmerodius albus*	22	2	4
		Snowy Egret	*Egretta thula*	2		
		Dark Ibis	*Plegardis talcinellus*			
		Great Blue Heron	*Ardea herodias*	13	1	3
		Little Blue Heron	*Egretta caerulea*	2		
		Tricolored Heron	*Egretta tricolor*	1		1
		Brown Pelican	*Pelecanus occidentalis*			
		Black-crowned Night Heron	*Nycticorax nycticorax*			
		Green Heron	*Butorides virescens*			
		Anhinga	*Anhinga anhinga*			7
		Double-crested Cormorant	*Phalacrocorax auritus*	19	3	16
		Green-backed Heron	*Butorides striatus*			
		Roseate Spoonbill	*Ajaia ajaja*			
	Totals			**194**	**59**	**100**

Appendix I
Wading Birds and Pelicans
Number of Birds per Transect and per Marsh Type
Observed in 2001

Location		Common Name	Scientific Name	Marsh Type		
				Saline	Brackish	Fresh/ Intermediate
Pipeline	West Observations	White Ibis	*Eudocimus albus*		2	5
		White Pelican	*Pelecanus erythrorhynchos*	2		
		Great Egret	*Casmerodius albus*	23	3	11
		Snowy Egret	*Egretta thula*	4	3	6
		Dark Ibis	*Plegardis talcinellus*			
		Great Blue Heron	*Ardea herodias*	9	8	14
		Little Blue Heron	*Egretta caerulea*	1		1
		Tricolored Heron	*Egretta tricolor*	1	1	1
		Brown Pelican	*Pelecanus occidentalis*	1		
		Black-crowned Night Heron	*Nycticorax nycticorax*			
		Green Heron	*Butorides virescens*			
		Anhinga	*Anhinga anhinga*			
		Double-crested Cormorant	*Phalacrocorax auritus*	14	26	3
		Green -backed Heron	*Butorides striatus*			
		Roseate Spoonbill	*Ajaia ajaja*			
	East Observations	White Ibis	*Eudocimus albus*			
		White Pelican	*Pelecanus erythrorhynchos*	32	2	
		Great Egret	*Casmerodius albus*	9	9	5
		Snowy Egret	*Egretta thula*	1		6
		Dark Ibis	*Plegardis talcinellus*			
		Great Blue Heron	*Ardea herodias*	5	3	7
		Little Blue Heron	*Egretta caerulea*	4		1
		Tricolored Heron	*Egretta tricolor*	2	1	3
		Brown Pelican	*Pelecanus occidentalis*	16	1	
		Black-crowned Night Heron	*Nycticorax nycticorax*			3
		Green Heron	*Butorides virescens*			
		Anhinga	*Anhinga anhinga*			2
		Double-crested Cormorant	*Phalacrocorax auritus*	50	36	
		Green -backed Heron	*Butorides striatus*			
		Roseate Spoonbill	*Ajaia ajaja*			
	Totals			**174**	**95**	**68**

Appendix I
Wading Birds and Pelicans
Number of Birds per Transect and per Marsh Type
Observed in 2001

Location		Common Name	Scientific Name	Marsh Type		
				Saline	Brackish	Fresh/ Intermediate
West Pipeline	West Observations	White Ibis	*Eudocimus albus*	63		
		White Pelican	*Pelecanus erythrorhynchos*	65		
		Great Egret	*Casmerodius albus*	9	10	12
		Snowy Egret	*Egretta thula*	13	1	1
		Dark Ibis	*Plegardis talcinellus*			
		Great Blue Heron	*Ardea herodias*	8	5	4
		Little Blue Heron	*Egretta caerulea*	1	1	
		Tricolored Heron	*Egretta tricolor*	2		
		Brown Pelican	*Pelecanus occidentalis*	3	3	
		Black-crowned Night Heron	*Nycticorax nycticorax*			3
		Green Heron	*Butorides virescens*			
		Anhinga	*Anhinga anhinga*			1
		Double-crested Cormorant	*Phalacrocorax auritus*	7	9	1
		Green -backed Heron	*Butorides striatus*			
		Roseate Spoonbill	*Ajaia ajaja*			
	East Observations	White Ibis	*Eudocimus albus*			
		White Pelican	*Pelecanus erythrorhynchos*	32		
		Great Egret	*Casmerodius albus*	7	4	13
		Snowy Egret	*Egretta thula*	1	4	
		Dark Ibis	*Plegardis talcinellus*			
		Great Blue Heron	*Ardea herodias*	7	4	6
		Little Blue Heron	*Egretta caerulea*	4	1	
		Tricolored Heron	*Egretta tricolor*	2		1
		Brown Pelican	*Pelecanus occidentalis*		2	
		Black-crowned Night Heron	*Nycticorax nycticorax*			
		Green Heron	*Butorides virescens*			
		Anhinga	*Anhinga anhinga*			1
		Double-crested Cormorant	*Phalacrocorax auritus*	5	7	4
		Green -backed Heron	*Butorides striatus*			
		Roseate Spoonbill	*Ajaia ajaja*			
	Totals			**229**	**51**	**47**
	Total for All Transects			**1,618**	**278**	**490**
	Total for All Transects & Marsh Types					**2,386**

Appendix I
Wading Birds and Pelicans
Number of Birds per Transect and per Marsh Type
Observed in 2001

Location		Common Name	Scientific Name	Marsh Type		
				Saline	Brackish	Fresh/ Intermediate
East Pipeline	West Observations	White Ibis	*Eudocimus albus*	1		
		White Pelican	*Pelecanus erythrorhynchos*			
		Great Egret	*Casmerodius albus*	7		9
		Snowy Egret	*Egretta thula*	3		
		Dark Ibis	*Plegardis talcinellus*			
		Great Blue Heron	*Ardea herodias*	10	2	5
		Little Blue Heron	*Egretta caerulea*	7	2	
		Tricolored Heron	*Egretta tricolor*	3	2	1
		Brown Pelican	*Pelecanus occidentalis*	2		
		Black-crowned Night Heron	*Nycticorax nycticorax*			
		Green Heron	*Butorides virescens*			2
		Anhinga	*Anhinga anhinga*			
		Double-crested Cormorant	*Phalacrocorax auritus*	14	11	2
		Green -backed Heron	*Butorides striatus*			
		Roseate Spoonbill	*Ajaia ajaja*			
	East Observations	White Ibis	*Eudocimus albus*	4		
		White Pelican	*Pelecanus erythrorhynchos*			
		Great Egret	*Casmerodius albus*	15	6	2
		Snowy Egret	*Egretta thula*	4	1	3
		Dark Ibis	*Plegardis talcinellus*			
		Great Blue Heron	*Ardea herodias*	15	6	3
		Little Blue Heron	*Egretta caerulea*	8	2	2
		Tricolored Heron	*Egretta tricolor*	10		
		Brown Pelican	*Pelecanus occidentalis*			
		Black-crowned Night Heron	*Nycticorax nycticorax*		1	
		Green Heron	*Butorides virescens*			
		Anhinga	*Anhinga anhinga*			2
		Double-crested Cormorant	*Phalacrocorax auritus*	25	17	177
		Green -backed Heron	*Butorides striatus*			
		Roseate Spoonbill	*Ajaia ajaja*			
		Unidentified			1	
	Totals			**128**	**51**	**208**

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