INTRODUCTION

Coastal wetland loss from both natural and human-induced causes is significant in Texas and is a continuing concern because of the essential role that wetlands play in fisheries production, flood control, erosion prevention, protection of water quality, groundwater replenishment, and recreation. The goal of no net loss of coastal wetlands and their functions and values can be achieved with active wetland restoration and creation programs that are based on sound planning and scientific approaches.

As a consequence of the recognized importance of coastal wetlands and the losses and degradation of both marine resources and wetland habitats, restoration, mitigation, and habitat creation are receiving greater attention. For example, the statute requiring the development of a State-owned Wetland Conservation Plan (PARKS & WILDLIFE CODE §14.002) includes provisions for sites for compensatory mitigation, enhancement, and restoration. The Galveston Bay National Estuary Program's (GBNEP) Comprehensive Conservation and Management Plan (CCMP) (GBNEP, 1994) considers wetlands loss and degradation as the number one management problem for the Galveston Bay system. The number two problem is degradation of water and sediment quality from contaminated runoff. The CCMP has given a very high priority to increasing the quality and quantity of wetlands, setting as a goal the expansion of the area of vegetated wetlands in the GBNEP area by 15,000 acres within 20 years. Wetland restoration and creation programs at a watershed level are ideal for helping to achieve the federal Clean Water Act (CWA) goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's waters and the goals of the GBNEP.

Wetland loss from numerous processes, including subsidence, filling, and drainage, has occurred in both Dickinson Bay and the Dickinson Bayou watershed. Approximately 54 percent of the wetlands in the Dickinson Bayou watershed and 68 percent in the Dickinson Bay area were lost between the 1950's and 1989. In addition, both the tidal and nontidal segments of Dickinson Bayou are classified as "water-quality limited" by the Texas Natural Resource Conservation Commission (TNRCC) due to elevated levels of total phosphorus, orthophosphorus, and fecal coliform bacteria. Sediment data for the bayou indicate possible elevated levels of trace metals, including arsenic, copper, mercury, and zinc. Eutrophic conditions and associated fish kills were common in the bayou prior to 1989. Wetland restoration and creation offer a unique opportunity to improve water and sediment quality, as well as provide additional wetland functions to the Galveston Bay system.

The purpose of this study is to develop sound, scientifically based plans for demonstration projects to help restore and create wetlands in Dickinson Bay and Bayou. These plans can be used as

mitigation projects for activities requiring compensatory mitigation under Section 404 of the CWA. Information in this report will also be useful in predicting the potential impacts of future development in the Dickinson Bayou watershed and the Dickinson Bay area.

MATERIALS AND METHODS

Field investigations of Dickinson Bay and Dickinson Bayou were conducted in September and October 1993 and March 1994 to select sites for wetland restoration and creation. The U.S. Geological Survey (USGS) 7.5-minute quadrangle maps (scale 1:24,000), county soil survey maps (scale 1:20,000), and color infra-red and black-and-white aerial photographs (1952, 1982, 1984, 1985, and 1989 at various scales) were used in the surveys.

In March 1994, two profiling and vegetation transects in a natural marsh and one transect in an adjacent unvegetated area were established on the southwestern shoreline of Dickinson Bay (figs. 1 and 2). A transect was also established at a site in Gum Bayou (figs. 1 and 3). Elevations, bearings, vegetation characteristics, sediment type, and salinities (where possible) were measured and recorded along the transects. Elevations were surveyed with a telescopic alidade, and compass bearings were taken with a Brunton Compass. Distances along transects were measured with a 30 m metal measuring tape. Salinities were taken with a hand-held refractometer or a salinity-conductivity-temperature (SCT) meter. In addition, four other sites in Dickinson Bayou were investigated for wetland restoration potential (figs. 1 and 3). Vegetation characteristics, sediment type, and salinities were measured and recorded for these areas. A hand-held seine was used to get a "snapshot" of aquatic species utilizing the sites.

Wetland sites were located and status and trends information determined using U.S. Fish and Wildlife Service (USFWS) GIS data files. Data files were based on maps prepared from photointerpretation of 1952 black-and-white (scale 1:24,000) and 1989 color infra-red (scale 1:62,500) aerial photographs. Delineation lines were transferred to Dickinson and Texas City USGS 7.5-minute quadrangle base maps. Digital wetland data for Dickinson Bayou were only available for the lower watershed. A boundary based primarily on highways was chosen as a boundary for wetlands status and trends data for the Dickinson Bay system.

On 1989 maps, wetlands are classified by system, subsystem, class, subclass, water regime, and special modifier in accordance with Cowardin et al. (1979). For the 1950's maps, wetlands are classified by system, subsystem, and class. White et al. (1993) describes the possible sources of errors in the process of photointerpreting and comparing 1950's and 1989 photography.

Figure 1. Dickinson Bay and the Dickinson Bayou Watershed

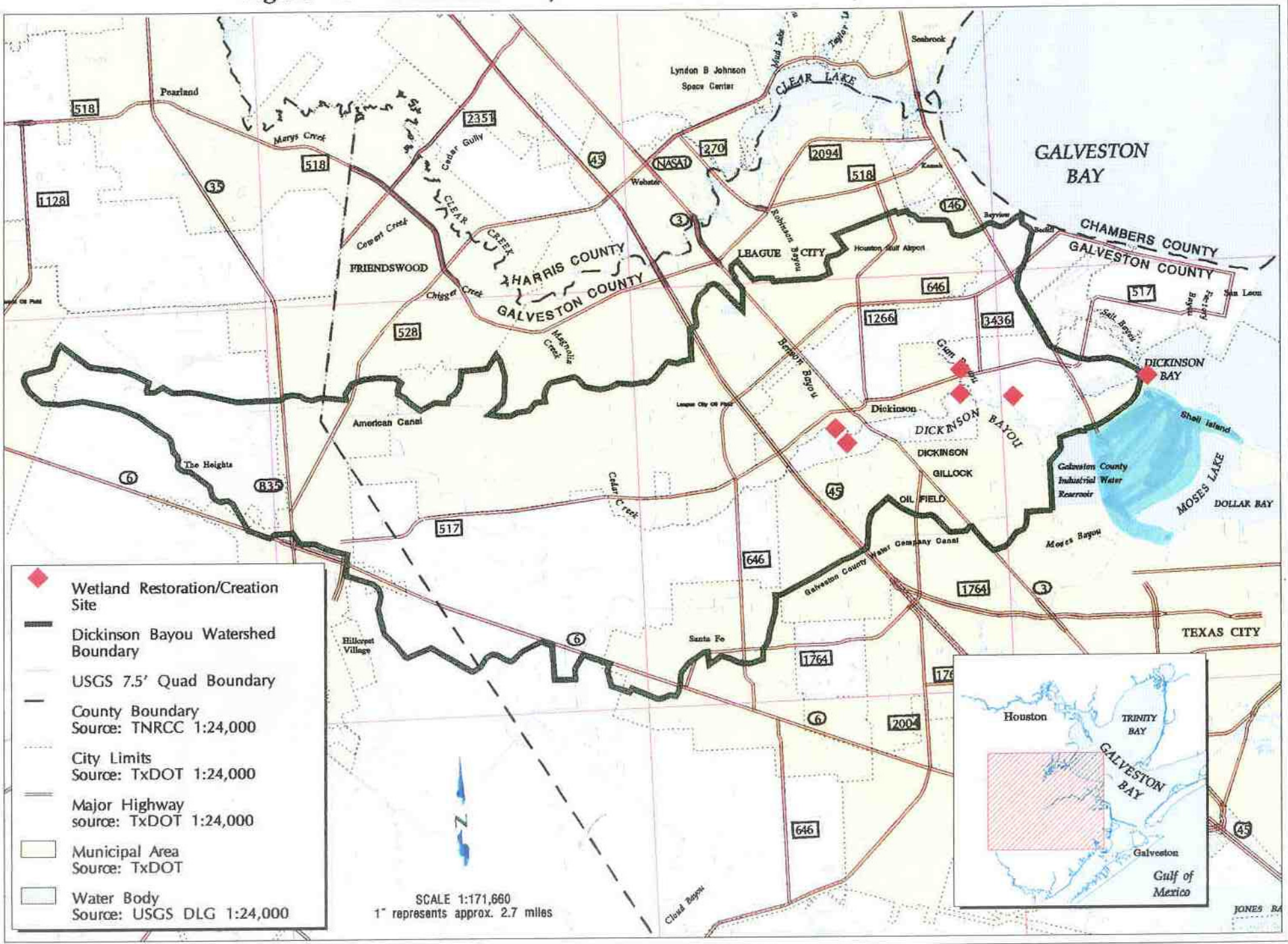

Figure 2. Color infra-red 1989 aerial photograph of Dickinson Bay showing approximate locations (arrows) of marsh creation sites; scale of photograph, 1:31,250.

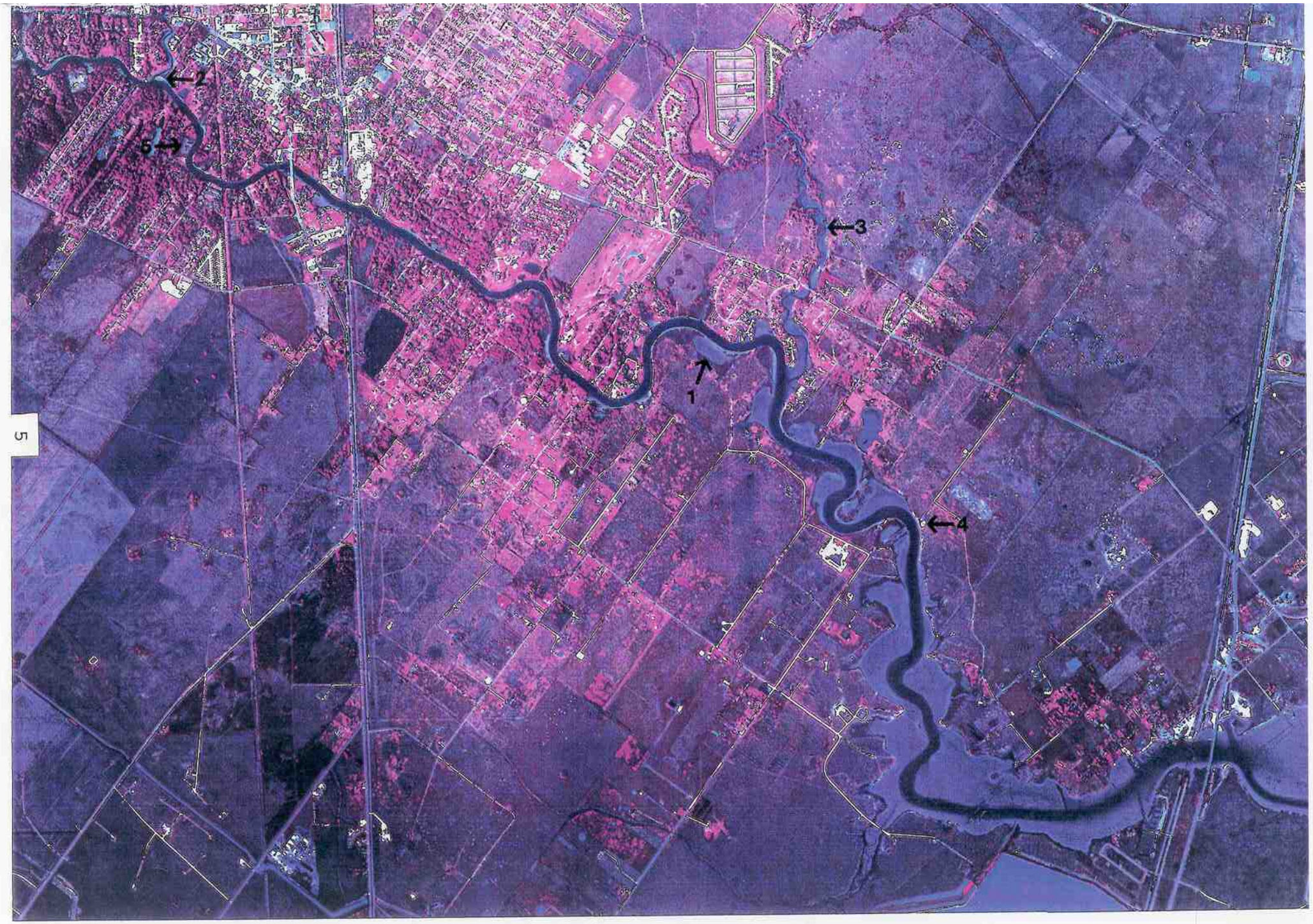

Figure 3. Color infra-red 1989 aerial photograph of Dickinson Bayou showing marsh restoration/creation sites; scale of photograph,