

1 . INTRODUCTION AND BACKGROUND

The single most obvious manifestation of human impacts on Galveston Bay is the physical modifications associated with excavation and disposal of sediments. After the close of the War for Southern Independence, increased navigation activities in the bay led to channelization, current training, and protective structures, which have accelerated to the present along with the proliferation of shipping and boating. Further, development of the Bay periphery has led to constructive dredge-and-fill activities not directly associated with navigation. Other related factors include the exploitation of biogeological resources within the Bay, viz. shell-dredging, and large-scale subsidence due to subsurface fluid withdrawal. The net effect has been an inexorable and ubiquitous alteration in the morphology of the Bay.

While the actions of dredging and filling associated with a specific project are immediately evident at the site, the cumulative activity over the entirety of the bay is not so readily ascertained, and even less so is the variation of that activity over a time frame of years. The objective of this study is to quantitatively characterize dredge-and-fill activities throughout the bay as a function of time. This required compilation and processing of several categories of historical data. This report provides an interpretive summary, and the compiled data comprise a centralized information base for further specific studies of associated biochemical impacts of dredging and sediment placement.

Organization of this material posed a problem in view of the changing nature of such activities over time. In the Nineteenth Century, for example, dredge-and-fill operations were dominated by navigation projects, which were primarily private, though with an increasing federal involvement in the last quarter of the century. Both the project objectives and the federal-private mix changed during the early Twentieth Century. Further, the basic process of undertaking such projects was altered profoundly in the last half of the Twentieth Century with the increasing regulatory role of the government. The character of the information base reflects this change of the federal rôle, as well, and circumscribes our ability to quantify these activities. Therefore, the approach adopted is to make an organizational break in time at World War II, to differentiate navigation and non-navigation projects for the period before WW II, and to differentiate federal and non-federal projects after WW II.

The appearance of the bay at the outbreak of WW II, as shown by the frontispiece, is not substantially different from that of the present, though a close inspection will reveal some important differences. The available information after WW II is much more refined and quantifiable than that prior to the war, so the technical presentation changes from qualitative and descriptive, to quantitative and analytical. This period also commanded the bulk of the project effort, in compiling extensive raw data from sources at the Corps of Engineers, consonant with the principal objectives of analyzing dredging records for federal projects and permit records for Department of the Army (DOA) regulated activities.

As will become evident, the range of activities and processes affecting the physiography of the bay is immense. In order to control the scope of this study and to focus on the primary concerns of the Galveston Bay National Estuary Program (GBNEP), the geographical bounds were limited to the estuarine system itself, specifically those areas that are routinely accessible by estuarine organisms and potentially afford significant habitat for these organisms. This means that the scope was restricted to the open bay, peripheral bays and routinely inundated regions, and the main stems of the principal tributaries. Smaller tributaries, e.g. Vince Bayou, East Bay Bayou, Hall Bayou, etc., though certainly capable of exploitation by estuarine organisms, cumulatively are a negligible proportion of the aquatic volume. Moreover, most of these minor tributaries are the focus of a major amount of dredge-and-fill activity, which clearly would have a distorting effect if included with those activities taking place within the main estuarine system. (One consequence of this focus of scope on the main estuary is that inland flood control projects can be excluded from the data analysis. Of course, hurricane protection projects, such as the Texas City Project, are a different matter and are included in the scope of the project.)

The original stated objective of this study was to examine specifically the recent and current dredge-and-fill work associated with navigation channels and with DOA (404)-regulated projects. As noted above, the study has been expanded beyond this in both time and process. With respect to the former, physiographic alterations to the bay have been traced since the mid-Nineteenth Century to the present. With respect to the latter, both subsidence and shell dredging have been considered as well, since these factors have also effected major alterations in the bay. In our view, the proper evaluation of the impacts of dredge-and-fill activities requires an appropriate perspective, i.e. long-term alterations in the bay environment, and a consideration of all major factors affecting the physiography of the bay. However, despite this expansion in scope, the original objectives of navigation channel dredging and disposal, and 404-regulated activities, commanded the greatest portion of the project effort.

A distinction is maintained between the quantitative information in the federal dredging records and the 404-permit files, and inferences or generalizations based upon that quantitative data. Much of this project effort was devoted to compiling and processing the quantitative data, the results of which are presented in Chapters 3 (for federal navigation projects) and 4 (for Department of the Army, a.k.a. Section 404, permits). The information on dates of dredging, volumes excavated, time-space distribution of 404 permits, and so forth, is regarded as matters of fact, subject only to numerical operations such as aggregation, accumulation and averaging. How these activities affect various habitat categories, the relationship of maintenance dredging to siltation rates, and the influence of dredge-and-fill projects on circulation or water quality in Galveston Bay, though also quantitative, require interpretations or hypotheses with which the reader may or may not agree. Such interpretive discussions are reserved for Chapter 5, so as to remain separate from the presentations of the data.

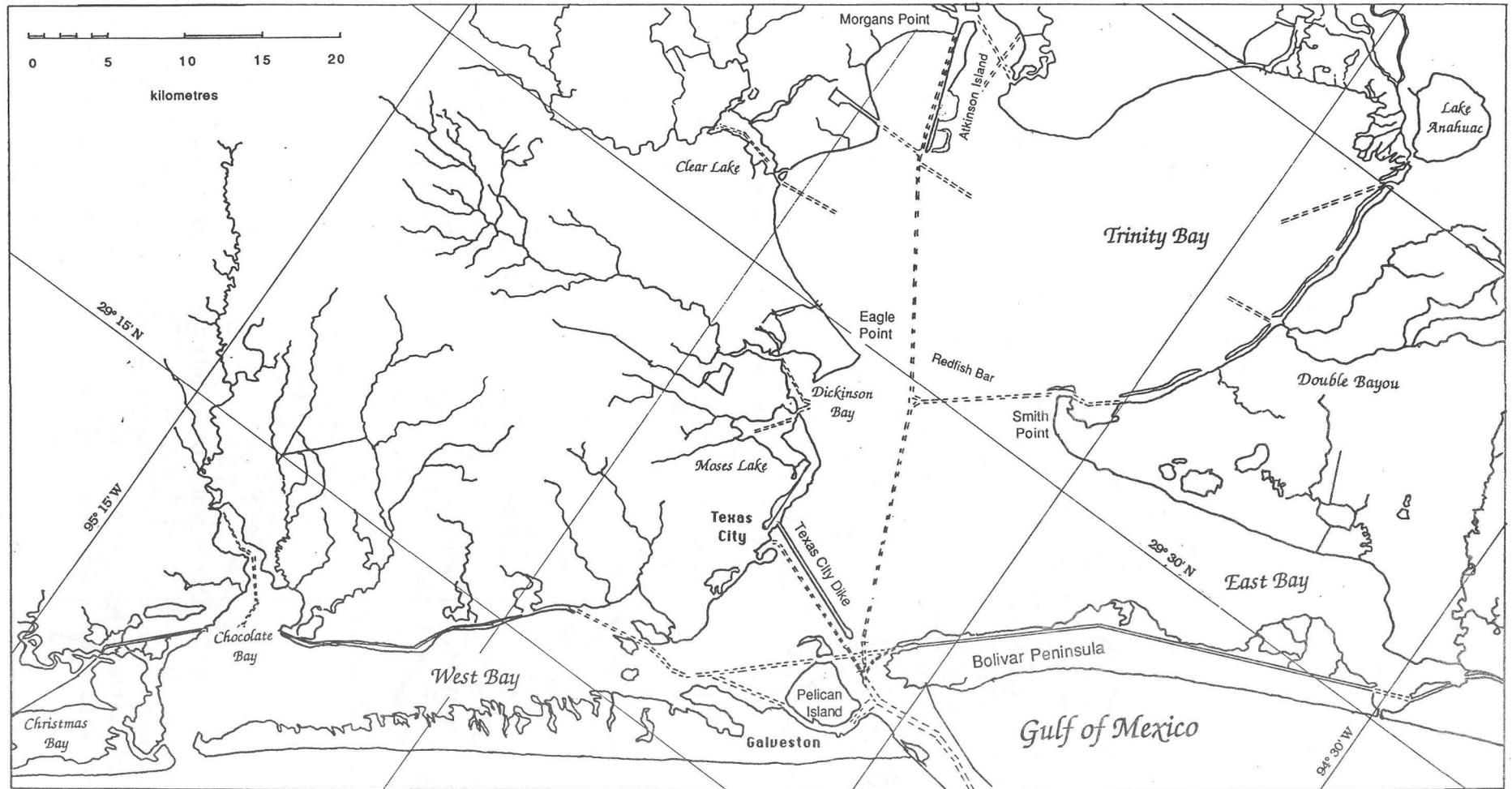


Figure 1-1. Location map of modern Galveston Bay

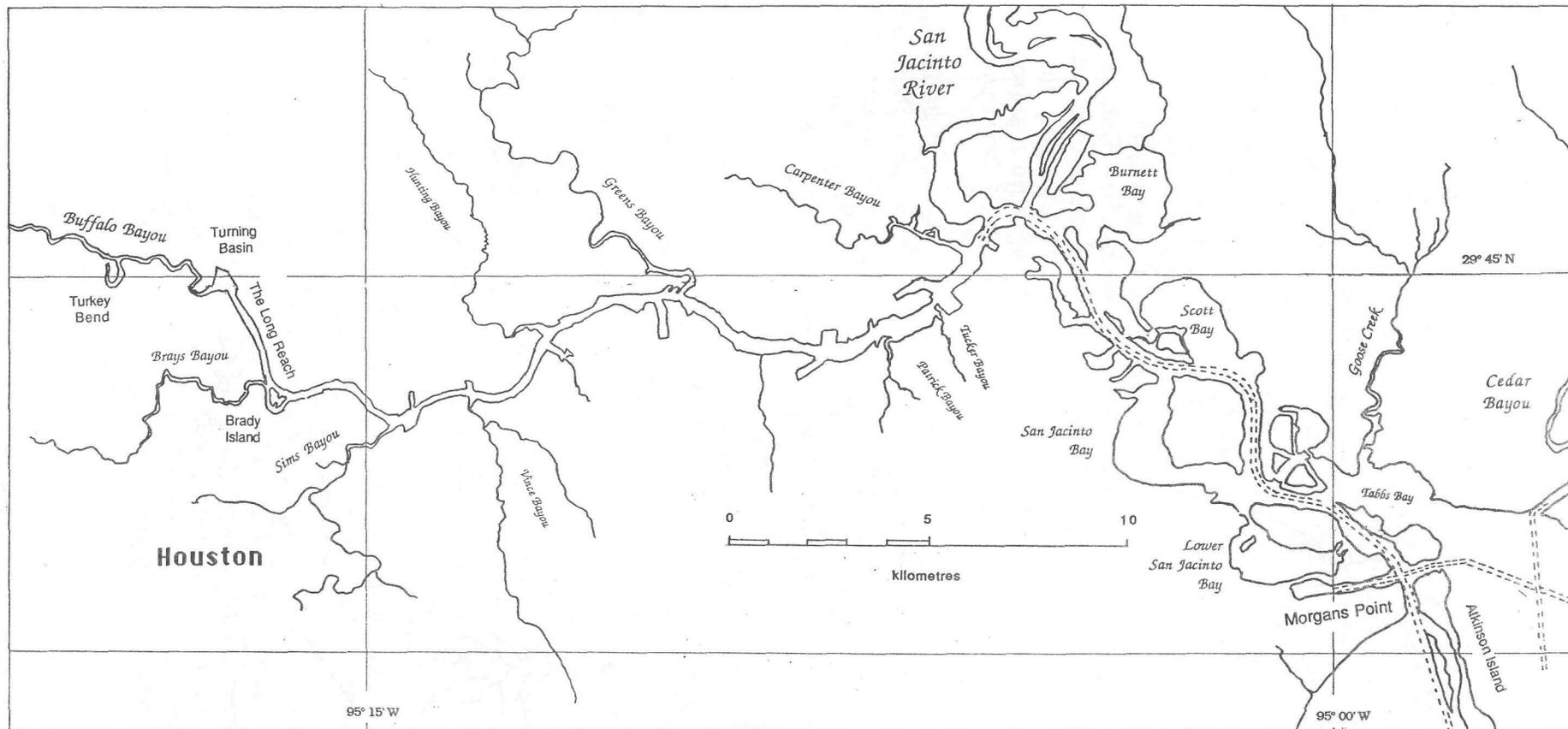


Figure 1-2. Location map of San Jacinto/Buffalo Bayou estuary and Houston Ship Channel above Morgans Point