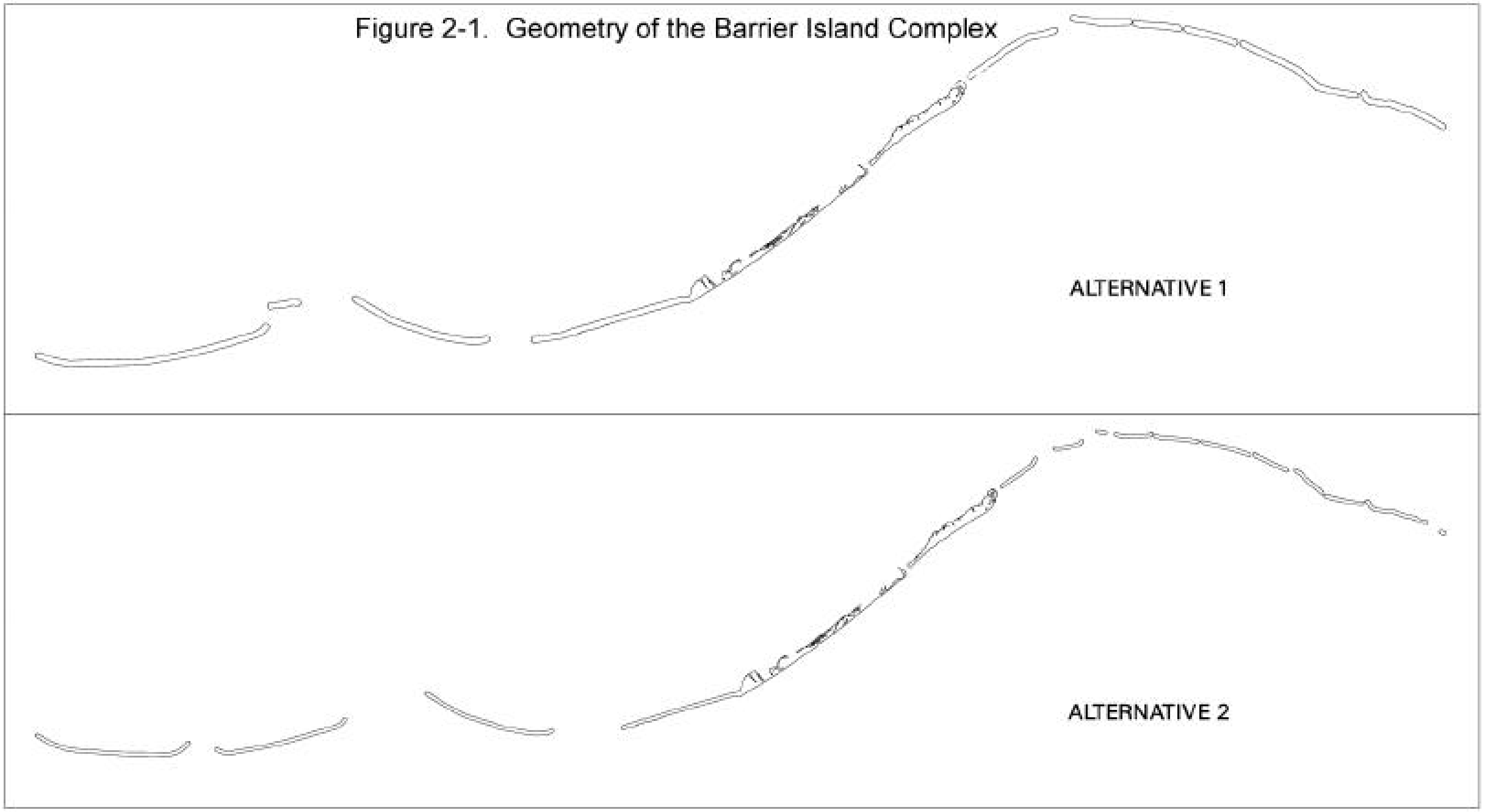
2.0. PREDICTING FUTURE WETLAND AREAS WITH PROJECT

This section describes the process used to develop maps depicting the reduction in land loss associated with Alternatives 1 and 2 on the estuarine wetlands in the study area. Land loss maps were developed for current conditions and for future conditions in the years 30 and 100. The land loss maps were then used to create "with project" landscape maps, which are discussed in Section 5 - Environmental Resource Benefits. The economic benefits are discussed in Section 6.0 - Economic Resource Benefits.

Several data sets were used in developing the wetland forecasts. The analysis was based upon a 1993 LANDSAT image obtained from Mr. Dewitt Braud of the Geography and Anthropology Department at Louisiana State University. The wetland loss rates in each area were obtained from the CWPPRA Feasibility Studies Steering Committee through Ms. Sue Hawes and Mr. Del Britch of the New Orleans District of the U. S. Army Corps of Engineers. The designated areas, or "polygons", were created based on similar land loss. Ms. Hawes also provided computations of the future acreage of wetlands for each polygon based upon the data from Mr. Del Britch. The geometry of the barrier island restoration alternatives, shown in Figure 2-1, is from the Barrier Shoreline Feasibility Study Steps I and K Reports (LADNR 1998i and 1998k).

Figure 2-1. Geometry of the Barrier Island Complex



2.1. Methodology

The method used to develop the wetland maps for Alternatives 1 and 2 was identical to that used to develop the no-action land/water maps. Briefly, the method was based upon selectively modifying certain areas of the LANDSAT image to reflect the loss of wetlands in that area. The image had a spatial resolution of 25 meters (82 feet) and was georeferenced. Each pixel (small square) in the LANDSAT image has a brightness value numerically represented by number ranging from 0 to 222 counts. Each pixel is assigned a pseudo-color varying from dark blue corresponding to the lowest end of the brightness range to bright white at the highest end of the range. Generally, solid wetland areas have high brightness, while open water areas have low brightness. The method is described in more detail in the Step G report (LADNR 1998g).

Wetland areas having intermediate brightness values were assumed to be mixtures of marsh and open water (i.e., broken marsh). It was further assumed that the brightness was proportional to the percentage of land. Therefore, brightness value could be used as a criterion to distinguish land from water such that areas having brightness values higher than the criterion are classified as land and those areas having brightness values lower than the criterion are classified as water. The area of land corresponding to the given land/water criterion can then be calculated as the sum of the land cells. If the criterion for land is raised to a higher value, then the number of cells having brightness values greater than the raised criterion decreases, resulting in less land area in the image. Conversely, if the land/water brightness criterion is lowered to a smaller value, then the number of land cells increases. Therefore, by changing the land/water criterion, wetlands can be added or removed from the image.

2.1.1. Marsh Shoreline Polygons

Land loss projections for the no-action scenario developed under Step G (LADNR 1998g) were modified for use in preparing Step J. In Step G, the polygons, to which contemporary land loss rates were applied, were large and in many cases encompassed both interior and shoreline types of marsh loss. Given that many of the effects of barrier shoreline restoration on mainland marshes are through modification of shoreline erosion rates, the no-action projections were modified to allow direct comparison with Alternative 1 and Alternative 2 land loss projections. The modification included redrawing of the polygons to separate areas experiencing shoreline erosion from wave action from those experiencing interior loss. Only the polygons were changed. Land loss rates for the new "marsh shoreline polygons" were derived from the same source and projected into the future using the methodologies described in Steps G and H (LADNR 1998g and 1998h.i). This modification can have two consequences:

1. The pattern of land loss may change.

2. The amount of land loss may change as the polygons were smaller. This would occur if the land loss projected exceeded the size of the polygon. Once all is lost in a polygon, no more can be lost. It is unlikely in this study that this change was significant as the polygons are still relatively large.

The original polygons defined in Step G were refined to more accurately depict the effects of the barrier island alternatives in reducing marsh erosion due to wave action. The study area was defined within Polygons A, B, F, M, S and Q, as shown in Figure 2-2. These areas do not include the barrier islands. In order to analyze the impacts of waves along the marsh shoreline smaller sub-polygons were developed by subdividing Polygons F and S. These sub-polygons were designated as F1, F2, F3, F4, F5, S1, S2, and S3, and are shown in Figure 2-3.

The reduction in wave energy due to the alternatives was determined using the change in mean wave height, where waves were greater than 10 cm (4 inches). This reduction in wave energy was used to adjust the amount of land loss in the marsh shoreline polygons. The projected land loss for the no-action alternatives for each marsh shoreline polygon was supplied by the CWPPRA Feasibility Studies Steering Committee through Ms. Sue Hawes. Images of the study area under the no-action scenario were prepared using the original LANDSAT pseudo-color scheme, as shown in Figures 2-4 and 2-5.

2.1.2. Modification of the LANDSAT Image

Using the approach described, each of the marsh shoreline polygons in the LANDSAT image was modified to "add back" land that would not have been lost due to the benefits of the alternatives. Alternatives 1 and 2 were added to the image based upon the barrier shoreline geometries shown in Figure 2-1. The same pseudo-color scale used in the original LANDSAT image was then applied to produce "future with project" images.

Figure 2-2. Sub-areas Authorized by the CWPPRA Steering Committee

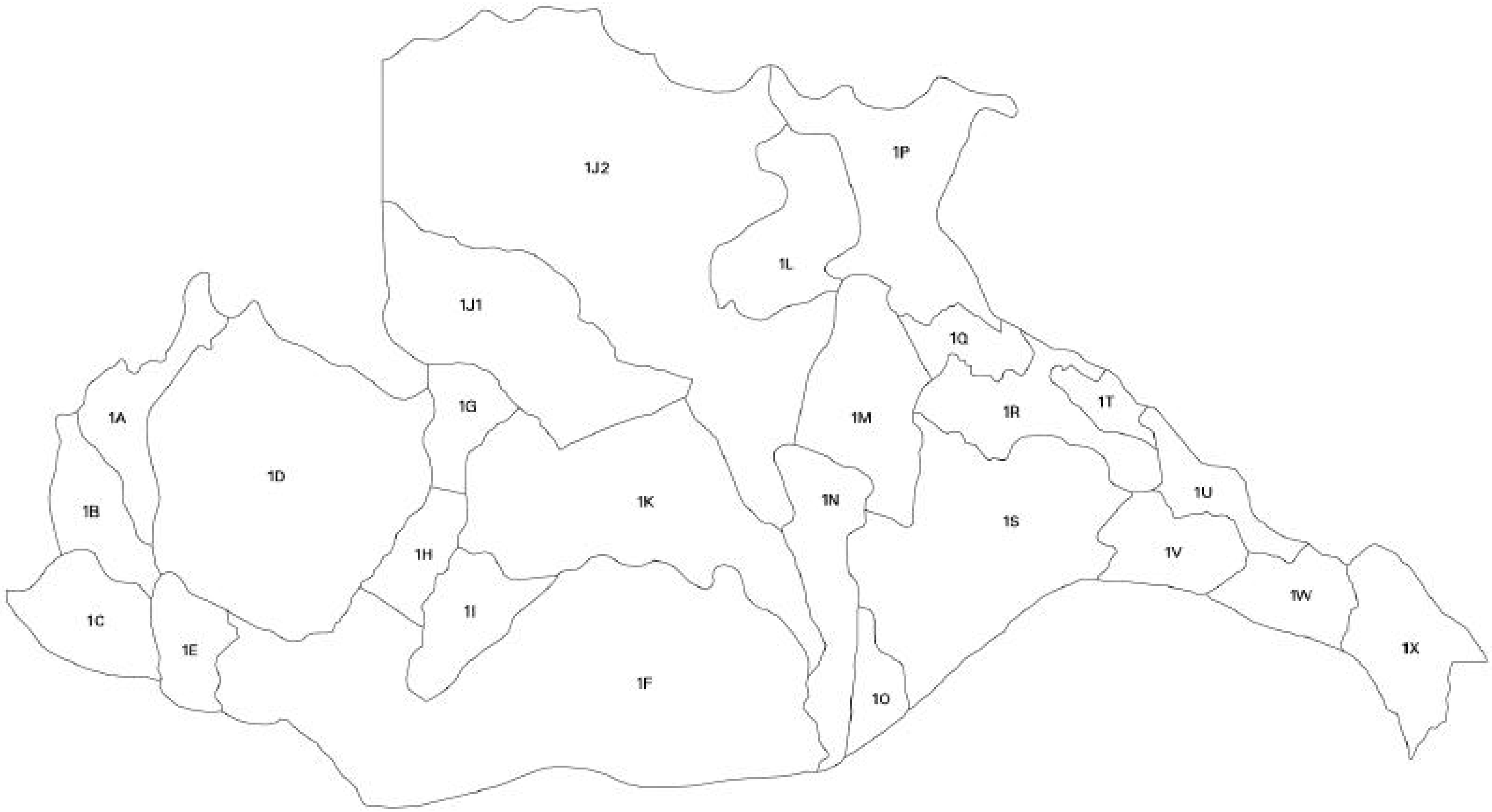
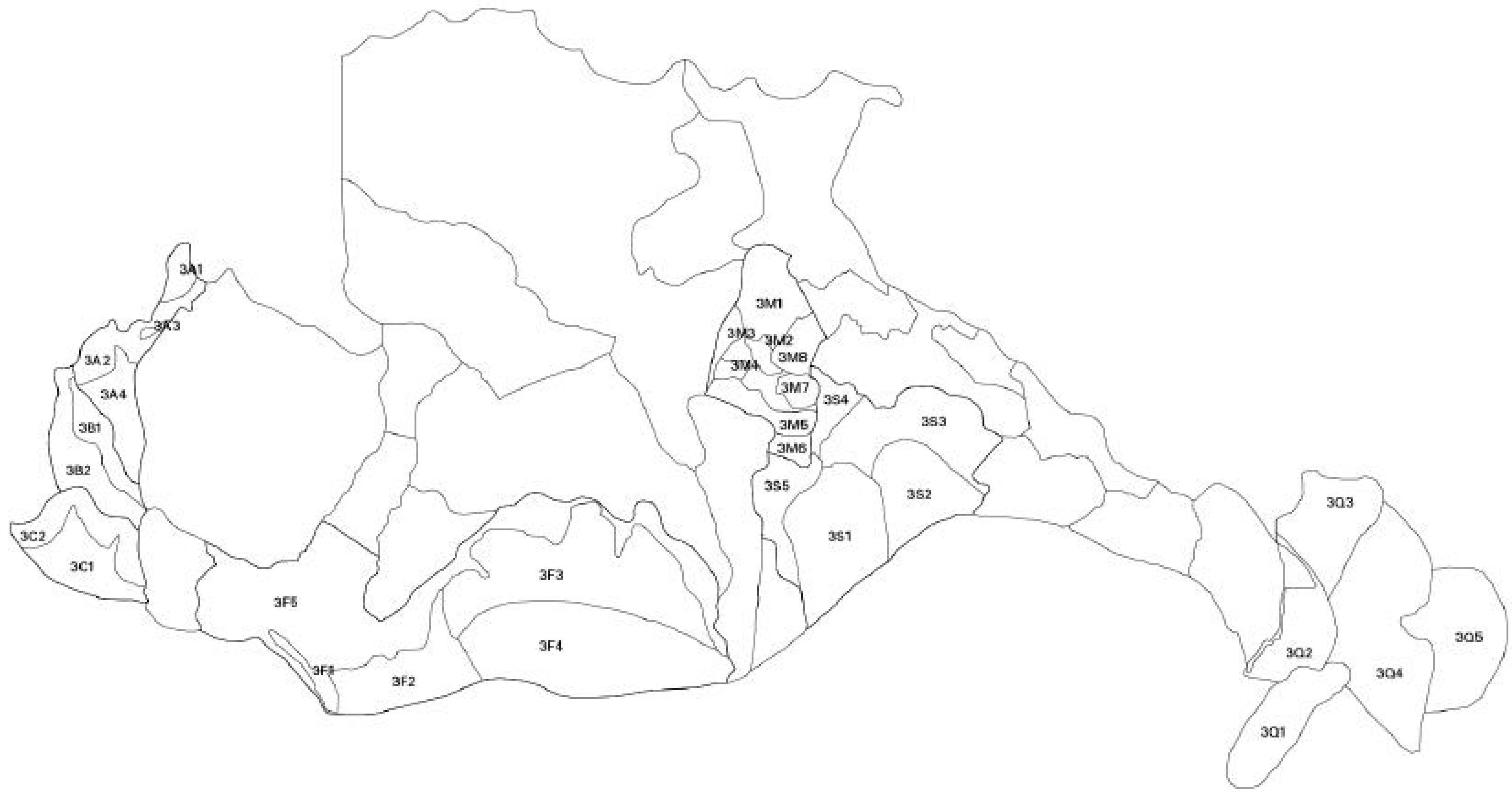


Figure 2-3. Sub-areas and Wave Polygons



2.2. Results

For no-action, in the 30-years (Figure 2-4), the land loss increases the fragmentation of the marsh. Marsh areas near bays retain a greater density of land, but further inland open water and land are about equal. For no-action in 100-years, many of the present marsh areas are mostly open water, as indicated in Figure 2-5. At this point, the wetland areas surrounding Terrebonne and Barataria bays show only scattered fragments of land located within large areas of open water. Some areas of the western Terrebonne marshes retain a greater distribution of land than water; however, these areas are considerably reduced in size and are surrounded by large bodies of open water as well. The boundary of Terrebonne Bay has expanded northward nearly to the Intracoastal Waterway and Barataria Bay extends northward almost to Bayou Perot and Bayou Rigolets. The corridor of land surrounding Bayou Lafourche is nearly gone.

Alternative 1 reduces the land loss in the marsh shoreline polygons by 3,613 hectares (8,928 acres) in 30-years. The loss reduction occurs in Barataria Bay, Terrebonne Bay, and in Lake Pelto. The projected preservation of land in 100-years due to Alternative 1 is 8,136 hectares (20,104 acres). The habitat type preserved is saline marsh primarily in Terrebonne Bay. The land preserved does not include the acreage of habitat created and maintained on the barrier islands. Overall, the projected loss of wetlands in the study area is 68,929 hectares (266 mi2) and 195,633 hectares (755 mi2) for 30- and 100-years respectively. This includes the projected benefits of authorized CWPPRA projects and the Davis Pond Freshwater Diversion project.

Alternative 2 is projected to preserve 316 hectares (781 acres) in 30-years and 3,583 hectares (8,854 acres) in 100-years. Most of this loss reduction also occurs in Terrebonne Bay and Lake Pelto. Again, this does not include the habitat created and preserved along the barrier shoreline. Changes in habitat landscape are discussed in detail in Section 5.0.

Figure 2-4. Projected Coast (30-Year, No-Action)

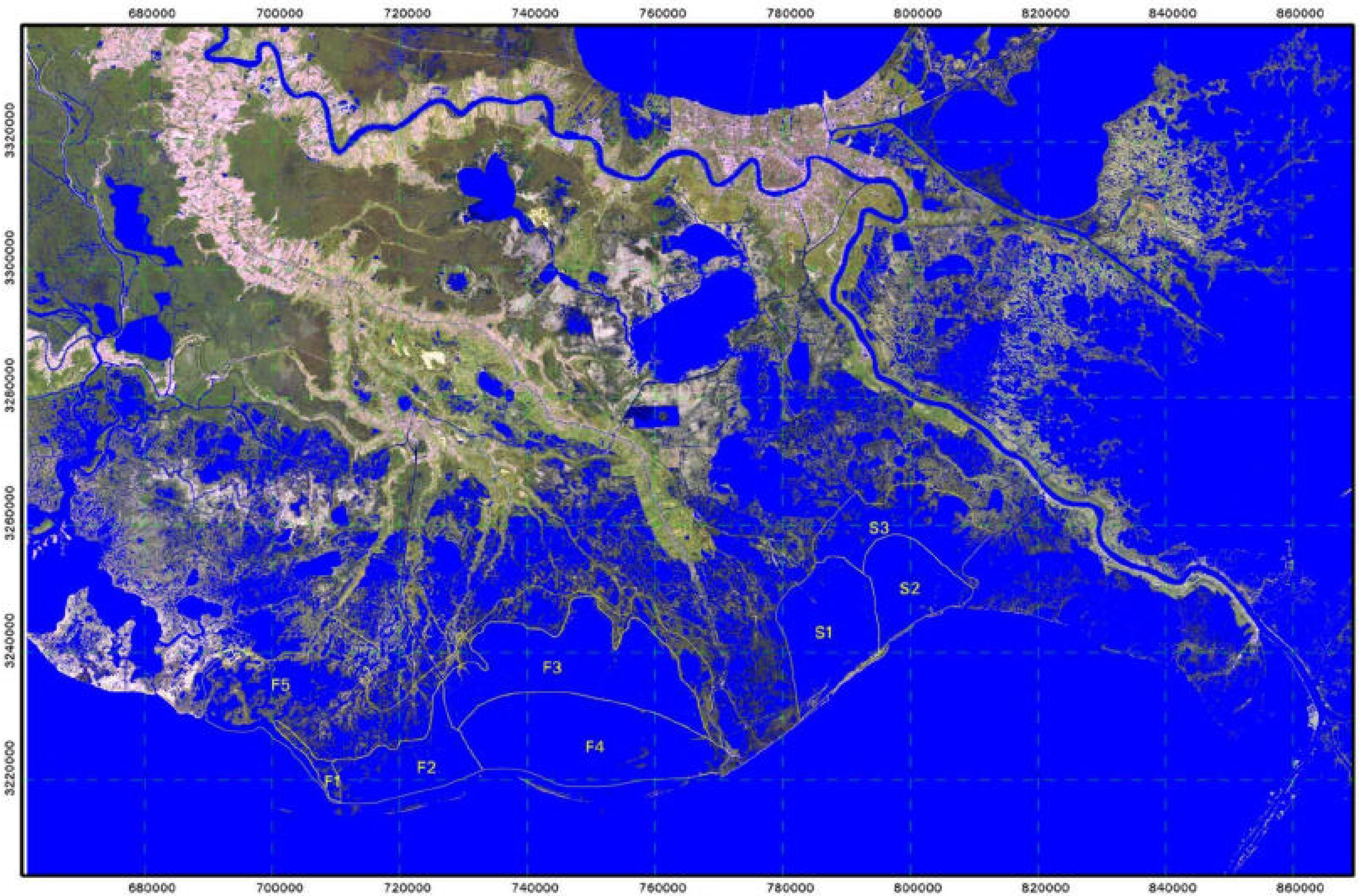


Figure 2-5. Projected Coast (100-Year, No-Action)