highs that were sea-floor expressions of rising evaporite diapirs.

At least 4 major regressive-transgressive cycles developed in response to episodic basin subsidence. In contrast to the Rocky Mountain Cretaceous transgressions, the Difunta accumulated sheet sandstone units 20–60 ft thick. Parts of the transgressive units are delta-destructional deposits, but many are coalesced progradational sheet sands.

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RECENT SEDIMENT DISTRIBUTION IN COLORADO DELTA AREA, NORTHERN GULF OF CALIFORNIA

Deposition in the northern Gulf of California is a battle between 2 giants: the Colorado River which supplies approximately 150 million tons of mud and sand a year to the area, and the Gulf with its strong tidal currents (up to 4 knots) which control depositional patterns in the coastal and marine environments. The river is winning; during the Quaternary a cone of sediment has prograded basinward covering more than 4,000 sq mi, of which Holocene sediments form only a broad lens in the southern margin of the delta wedge.

A group of 14 continuously cored borings supplemented by surface observations of sediment distribution and processes document both sedimentologic attributes and facies relations of genetic-sand types in the Holocene. These sand facies include (1) tidal bars in the marine environment; (2) barriers, cheniers, sand-tidal flats, tidal deltas, and tidal and estuarine channels in the coastal environment; and (3) fluvial channels, alluvial bars, and dunes in the continental environment.

The late Holocene depositional record typically is characterized by a single regressive section except along the western margin of the basin where multiple regressive sequences, each separated by a transgressive sand, are common as a result of river shifting. The regressive sections either overlie a thin transgressive sand deposited during an early Holocene rising sea-level stage or lie directly on Pleistocene strata.

In a complete offlap sequence the lower part is characterized by marine bar sands and/or marine clays. This lower marine part of the sequence thins northward under the deltaic cone and is absent in the northernmost areas. The upper part of the sequence is much more variable, consisting predominantly of coalescing, upward-fining channel (estuarine, tidal, and fluvial) deposits in the northern and central parts, upward-coarsening coastal-barrier sands along the eastern margin, and mud-flat and coarse alluvial-fan deposits on the western margin of the basin.

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GROWTH RATES OF BEACH RIDGES ON SANIBEL ISLAND, FLORIDA

Sanibel Island, a barrier island located approximately 100 mi south of Tampa along the southwest Florida coast, is about 13 mi long with a curved axis, and comprises a land area of about 18 sq mi with a convex shore facing seaward.

At least 7 distinct sets of beach ridges are present on the island. These are separated by lines of truncation causing the older sets to intersect younger sets at angles ranging from nearly 90° to about 10°. The sets consist of varying numbers of individual subparallel-beach ridges with the total number in a set ranging from 10 to over 80.

Elevation of the beach ridges differs with regard to comparison of whole sets and individual ridges differ systematically within each set. Mangrove peat and intertidal marsh cover the oldest sets, which were deposited at an elevation below present mean sea level. The highest beach ridges occur in the Wulfert Ridge set, which has maximum elevations near 10 ft above present mean sea level.

The second highest ridge set has a radiocarbon age of 2,375 ± 75 years, and the Wulfert Ridge set has an average age of 2,131 ± 100 years. Other radiocarbon dates show the chronologic depositional history of the island and rates of sedimentation. The geometry and elevation of the Wulfert Ridge set indicate a possible higher stand of sea level 2,000 years ago.

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PETROLEUM-DERIVED HYDROCARBONS IN GULF OF MEXICO WATERS

Petroleum-type hydrocarbons occur in waters of the Gulf of Mexico principally as particulate material floating on the surface of the water (tar balls) and as dissolved components in the water column. Gas-chromatographic, mass-spectrometric, and carbon isotopic analytical methods have been used to characterize the hydrocarbons in tar balls from western Gulf beaches. These analyses provide a "fingerprint" which indicates that the source of some of the tar ball materials is from seeps.

Dissolved hydrocarbons have been measured both near producing platforms and in the open Gulf. The amounts of dissolved hydrocarbons in the water near producing platforms have been measured to provide basic data useful for interpreting the possible impact of oil production on marine ecology. Samples were taken approximately 20 ft below the surface to eliminate any effects of surface films, although none were visible at the time of sampling. Gaseous hydrocarbons (C_1-C_4) were less than 1 microgram/kg, light-liquid hydrocarbons (C_5-C_{10}) were less than 0.7 microgram/kg, and heavy hydrocarbons (C_{15}^+) were less than 5 micrograms/kg.

These values are not different significantly from values measured on samples from the open Gulf. There does not appear to be an increase in dissolved hydrocarbons in the water near producing platforms.

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SUBMARINE CURRENT MEASUREMENTS, NORTHWEST GULF OF MEXICO

In February 1966, Exxon Corporation undertook a geophysical and geologic survey of the continental slope of the Gulf of Mexico from Texas to Florida. They were joined in May by Standard Oil Company of California and in August by Gulf and Mobil Oil Companies.

As part of this survey the *Caldrill* 1 was to drill 42 coreholes at 36 sites. Submarine current measurements were to be recorded while the vessel was on station. Because of technical difficulties, submarine-current records were obtained at only 6 northwestern sites.

Vertical current profiles at 5 of the 6 stations show two prevailing directions which may represent distinct water masses. The upper current flows generally east or northeast, increasing from about 0.2 knots in the west to about 0.4 knots in the east. Below this system is a current that flows west or northwest at similar rates. The interface between these water masses deepens