

- ### Explanation
- #### HOLOCENE
- ##### Matagorda Formation Lavaca Member (Fluvial and Deltaic Deposits)
- Qm1-c** – Channel and channel fill. Unconsolidated sand and mud filling abandoned fluvial channels.
 - Qm1-l** – Levee. Unconsolidated sand and mud in low, narrow areas subparallel and adjacent to active and abandoned stream channels.
 - Qm1-cs** – Crevasse splay. Unconsolidated sand and mud deposited in fans adjacent to stream channels and levees.
 - Qm1-lc** – Levee and crevasse splay, undifferentiated. Unconsolidated sand and mud deposited in levee and crevasse-splay setting.
 - Qm1-fd** – Fan or fan delta. Unconsolidated sand and shell deposited adjacent or near to bay shoreline. Commonly unvegetated.
 - Qm1-fp** – Flood plain. Unconsolidated mud and sand deposited on a low-relief valley floor during floods. Includes some minor levees, crevasse splays, and active and abandoned stream channels. Coastal prairie or wetland vegetation.
 - Qm1-dp** – Delta plain. Unconsolidated mud and sand deposited in bay-margin delta. Includes some minor fluvial levees, crevasse splays, tidal-channel levees, and active and abandoned stream and tidal channels. Brackish- or fresh-water marsh vegetation.
- ##### Carancahua Member (Bay- and Estuarine-margin Deposits)
- Qm1-m** – Marsh. Unconsolidated mud and sand deposited in low-relief areas adjacent to bay shoreline. Common tidal channels. Salt- or brackish-water marsh vegetation.
 - Qm1-b** – Bay-margin beach or berm. Unconsolidated sand, shell, and mud deposited along bay shoreline from wave action and minor overwash. Beach is unvegetated; berm is sparsely vegetated.
 - Qm1-ba** – Beach or berm, abandoned. Unconsolidated sand, shell, and mud deposited in an abandoned low berm along former bay shorelines from wave action. Commonly vegetated.
 - Qm1-sp** – Spit. Unconsolidated sand and shell deposited adjacent or near to bay shoreline. Commonly unvegetated.
 - Qm1-tf** – Tidal flat. Unconsolidated sand and mud deposited in a tidal flat that is periodically inundated by astronomical tides or wind-driven water at the margins of bays or tributary valleys. May include barren or vegetated areas and algal mats. In Lake Anahuac, part of remnant delta plain.

- #### HOLOCENE TO PLEISTOCENE
- Qa1** – Alluvium, undifferentiated. Unconsolidated sand, silt, and clay deposited in a variety of environments along streams and drainages. May include Holocene deposits.
 - Qd3** – Deweyville Formation, third fluvial terrace. Unconsolidated sand, silt, clay, and less gravel deposited in alluvial channel, levee, point-bar, and flood-plain settings at elevations lower than the second fluvial terrace.
 - Qd3-c** – Deweyville Formation, third fluvial terrace channel fill. Unconsolidated mud and sand deposited in abandoned channels on fluvial terrace at elevations lower than the second terrace.
 - Qd2** – Deweyville Formation, second fluvial terrace. Unconsolidated sand, silt, clay, and less gravel deposited in alluvial channel, levee, point-bar, and flood-plain settings at elevations lower than the highest fluvial terrace.
 - Qd2-c** – Deweyville Formation, second fluvial terrace channel fill. Unconsolidated mud and sand deposited in abandoned channels on fluvial terrace at elevations lower than the highest fluvial terrace.
 - Qd** – Deweyville Formation, fluvial terrace, undivided. Unconsolidated sand, silt, clay, and less gravel deposited in alluvial channel, levee, point-bar, and flood-plain settings at elevations above the modern flood plain and below the Beaumont Formation depositional surface.
 - Qd-c** – Deweyville Formation, fluvial terrace channel fill. Unconsolidated mud and sand deposited in abandoned channels on fluvial terrace at elevations above the modern flood plain and lower than the Beaumont Formation depositional surface.

- #### PLEISTOCENE
- ##### Beaumont Formation
- Qb-c** – Beaumont Formation, clayey facies. Semiconsolidated clay, silt, sand, and minor gravel deposited in fluvial-deltaic, interdistributary, distributary, bay and estuarine settings. Includes flood-plain and delta-plain deposits and minor channel, levee, and crevasse-splay deposits.
 - Qb-s** – Beaumont Formation, sandy facies. Semiconsolidated sandy mud, silt, and some fine sand deposited in fluvial- and distributary-channel setting.
 - Qb-ch** – Beaumont Formation, channel facies. Semiconsolidated sandy clay to clayey sand deposited in abandoned stream or distributary channels.
 - Qbi** – Ingleside barrier island, barrier peninsula, and strandplain, undifferentiated. Semiconsolidated sand, silt, and lesser clay deposited in barrier island, barrier peninsula, or strandplain setting. Common pimple mounds, closed basins, and ridge-and-swale topography.
 - Qbi-r** – Ingleside barrier island ridge. Semiconsolidated sand deposited in generally coast-parallel topographic high showing barrier-island progradation. Live oak common.
 - Qbi-s** – Ingleside barrier island swale. Semiconsolidated sand and mud deposited in topographic troughs between progradational ridges.
 - Qbi-bbi** – Ingleside back barrier and lagoon. Semiconsolidated sand and mud deposited in back barrier or lagoon environment in the Ingleside barrier-island system.
 - Qbi-dw** – Ingleside barrier drainageway. Semiconsolidated sand, silt, and lesser clay deposited in former Ingleside larger swales, tidal channels, and washover channels. Generally low elevation with few pimple mounds. Commonly flooded by storm-elevated tides.
 - Qbi-elb** – Ingleside ephemeral lake basin. Semiconsolidated sand and mud deposited in closed or connected topographic basins in a barrier-island or strandplain environment. May include younger lacustrine deposits.

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| — Contact (distinct) | — Meander scar | Water, Ocean, bay, large lake, or large stream connected to bay | DMR, Dredged material, reworked |
| - - - - Contact (gradational) | - - - - Normal fault - Approximately located | SPW, Selected ponded water | Fill, Land artificially elevated by fill material |
| — Map boundary | — Qb and Qd paleochannels | DCP, Dredged or excavated canal, ditch, or pond | Pit, Excavated area. May contain standing water. |
| — Waterline | — Stream (active or intermittent), drainage ditch, canal, or tidal channel | DMDA, Dredged material disposal area | Sand pit, Excavation area for sand or gravel. May contain standing water in ponds. |

Acknowledgments

This map is compilation of coastal plain mapping around Trinity Bay (part of the Galveston Bay system) on the Upper Texas Coast that includes the Anahuac, Oak Island, Cove, and Umbrella Point quadrangles (Caudle and Paine, 2023, 2024, 2025).

Photography used in the study included 0.6-m pixel, natural color, National Agriculture Imagery Program (NAIP) digital imagery, photographed in 2024 (2) 0.6-m resolution, natural color, NAIP digital imagery photographed in 2022, (3) 0.6-m resolution, natural color, NAIP digital imagery photographed in 2020; (4) 1:24,000-scale Tobin aerial photographic mosaics of the Anahuac, Oak Island, Cove, and Umbrella Point quadrangles flown in August 1956; and (5) 1:24,000-scale Tobin aerial photographic mosaics of the four quadrangles flown in April 1930. NAIP imagery was downloaded from the Texas Geographic Information Office (TXGIO). Photography was supplemented by 1-m cell size digital elevation models (DEMs) constructed from data acquired during airborne lidar surveys flown by Sanborn Mapping Company in 2017 and by Fugro USA Land, Inc. in 2018. The lidar datasets were for the Texas Geographic Information Office (TXGIO) Texas Strategic Mapping (StratMap) program. Soil data from U.S. Department of Agriculture Soil Survey program, wetland data from the National Wetlands Inventory distributed by the U.S. Fish & Wildlife Service, and State of Texas well reports downloaded from the Texas Water Development Board's (TWDB) Groundwater Database were used to assist in feature interpretation. The study included field observations of surficial deposits and contacts and interpretation of surface and subsurface electrical conductivities measured using a ground-based electromagnetic induction conductivity meter (Geonics EM38, McNeill, 1980a, 1980b). Streams and drainage ditches were mapped from aerial imagery and the lidar-derived DEM.

Previous regional maps that cover this area include the 1:250,000-scale Geologic Atlas of Texas, Houston Sheet (Aronow and others, 1968; revised 1982), the 1:125,000-scale Environmental Geologic Atlas, Galveston-Houston Sheet (Fisher and others, 1972), and the 1:125,000-scale Distribution of Wetlands and Benthic Macroinvertebrates map (White and others, 1985). The rationale for the mapping approach to Holocene fluvial, deltaic, bay, and estuarine deposits is described in Paine and others (in press).

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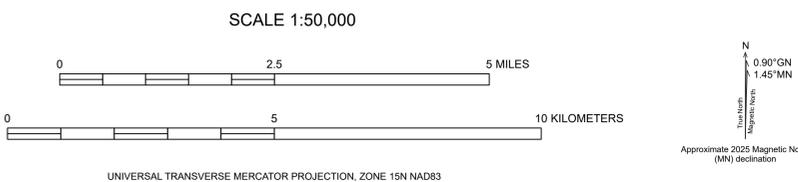
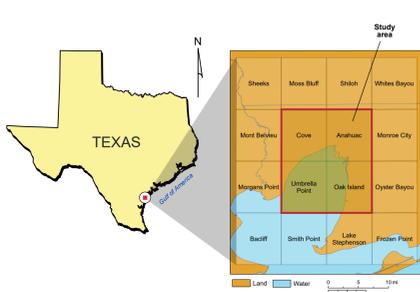
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GEOLOGIC MAP OF TRINITY BAY TEXAS GULF COAST

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2025

System	Series	Time (ka)	Fluvial-Deltaic					Map Units				Gulf margin			
Quaternary	Holocene	0	Qa1	Qd3	Qd3-c	Qd2	Qd2-c	Qm1-m	Qm1-b	Qm1-ba	Qm1-sp	Qm1-tf			
		~12	Qd	Qd-c	Qm1-c	Qm1-l	Qm1-cs								
	Pleistocene	~12	Qm1-lc	Qm1-fp	Qm1-dp	Qm1-fd									
		-2.600	Qa1	Qd3	Qd3-c	Qd2	Qd2-c						Qbi-bbi	Qbi	Qbi-r
			Qd	Qd-c	Qb-c	Qb-s	Qb-ch						Qbi-dw	Qbi-elb	