Preliminary Geologic Map Offshore Delaware

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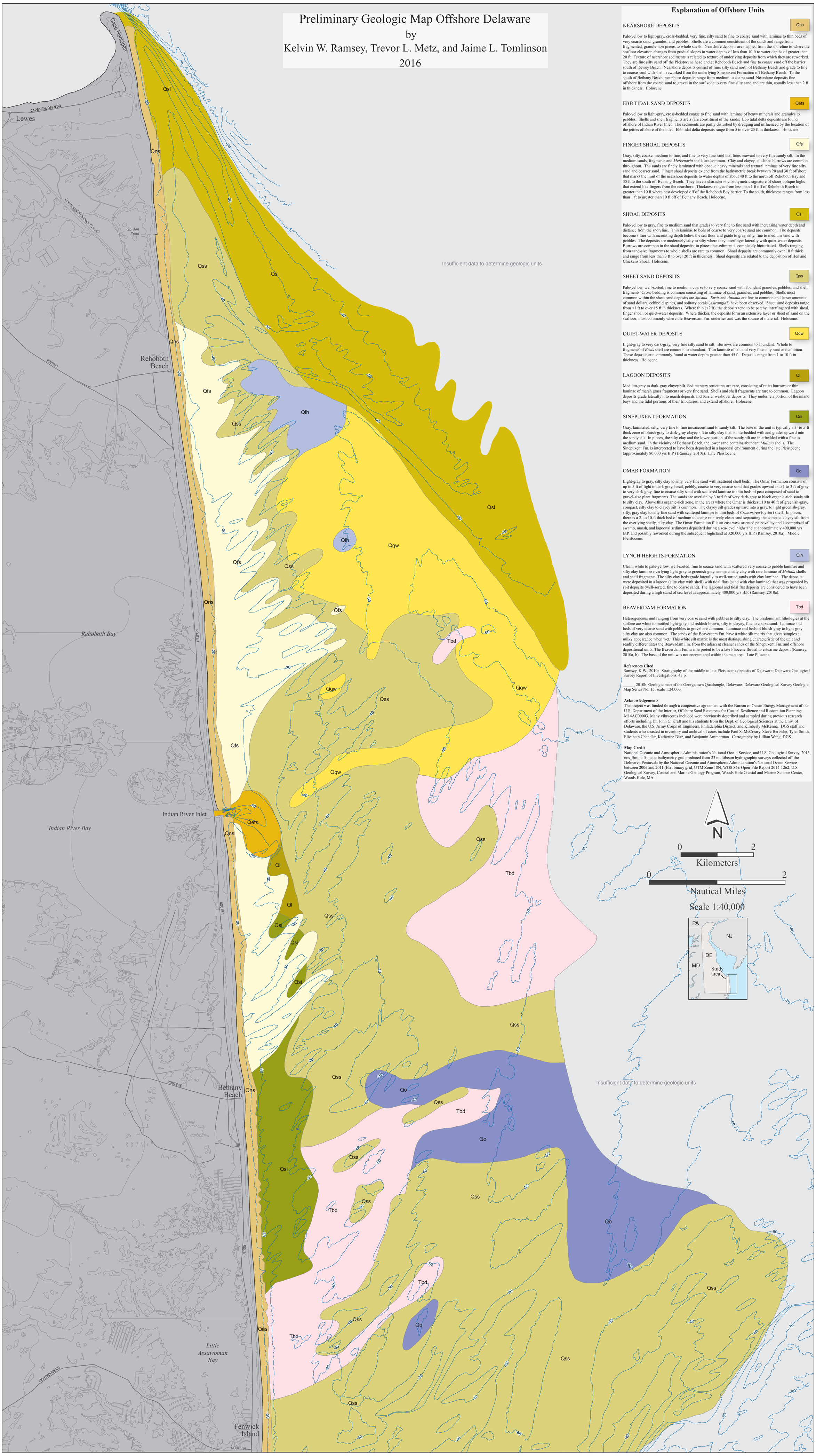

Explanation of Offshore Units

NEARSHORE DEPOSITS — Qns

Pale-yellow to light-gray, cross-bedded, very fine, silty sand to fine to coarse sand with laminae to thin beds of very coarse sand, granules, and pebbles. Shells are a common constituent of the sands and range from fragmented, granule-size pieces to whole shells. Nearshore deposits are mapped from the shoreline to where the seafloor elevation changes from gradual slopes in water depths of less than 10 ft to water depths of greater than 20 ft. Texture of nearshore sediments is related to texture of underlying deposits from which they are reworked. They are fine silty sand off the Pleistocene headland at Rehoboth Beach and fine to coarse sand off the barrier south of Dewey Beach. Nearshore deposits consist of fine, silty sand north of Bethany Beach and grade to fine to coarse sand with shells reworked from the underlying Sinepuxent Formation off Bethany Beach. To the south of Bethany Beach, nearshore deposits range from medium to coarse sand. Nearshore deposits fine offshore from the coarse sand to gravel in the surf zone to very fine silty sand and are thin, usually less than 2 ft in thickness. Holocene.

EBB TIDAL SAND DEPOSITS — Qets

Pale-yellow to light-gray, cross-bedded coarse to fine sand with laminae of heavy minerals and granules to pebbles. Shells and shell fragments are a rare constituent of the sands. Ebb tidal delta deposits are found offshore of Indian River Inlet. The sediments are partly disturbed by dredging and influenced by the location of the jetties offshore of the inlet. Ebb tidal delta deposits range from 5 to over 25 ft in thickness. Holocene.

FINGER SHOAL DEPOSITS — Qfs

Gray, silty, coarse, medium to fine, and fine to very fine sand that fines seaward to very fine sandy silt. In the medium sands, fragments and *Mercenaria* shells are common. Clay and clayey, silt-lined burrows are common throughout. The sands are finely laminated with opaque heavy minerals and textural laminae of very fine silty sand and coarser sand. Finger shoal deposits extend from the bathymetric break between 20 and 30 ft offshore that marks the limit of the nearshore deposits to water depths of about 40 ft to the north off Rehoboth Bay and 35 ft to the south off Bethany Beach. They have a characteristic bathymetric signature of shore-oblique highs that extend like fingers from the nearshore. Thickness ranges from less than 1 ft off of Rehoboth Beach to greater than 10 ft where best developed off of the Rehoboth Bay barrier. To the south, thickness ranges from less than 1 ft to greater than 10 ft off of Bethany Beach. Holocene.

SHOAL DEPOSITS — Qsl

Pale-yellow to gray, fine to medium sand that grades to very fine to fine sand with increasing water depth and distance from the shoreline. Thin laminae to beds of coarse to very coarse sand are common. The deposits become siltier with increasing depth below the sea floor and grade to gray, silty, fine to medium sand with pebbles. The deposits are moderately silty to silty where they interfinger laterally with quiet-water deposits. Burrows are common in the shoal deposits; in places the sediment is completely bioturbated. Shells ranging from sand-size fragments to whole shells are rare to common. Shoal deposits are commonly over 10 ft thick and range from less than 3 ft to over 20 ft in thickness. Shoal deposits are related to the deposition of Hen and Chickens Shoal. Holocene.

SHEET SAND DEPOSITS — Qss

Pale-yellow, well-sorted, fine to medium, coarse to very coarse sand with abundant granules, pebbles, and shell fragments. Cross-bedding is common consisting of laminae of sand, granules, and pebbles. Shells most common within the sheet sand deposits are *Spisula*. *Ensis* and *Anomia* are few to common and lesser amounts of sand dollars, echinoid spines, and solitary corals (*Astrangia*?) have been observed. Sheet sand deposits range from <1 ft to over 15 ft in thickness. Where thin (<2 ft), the deposits tend to be patchy, interfingered with shoal, finger shoal, or quiet-water deposits. Where thicker, the deposits form an extensive layer or sheet of sand on the seafloor; most commonly where the Beaverdam Fm. underlies and was the source of material. Holocene.

QUIET-WATER DEPOSITS — Qqw

Light-gray to very dark-gray, very fine silty sand to silt. Burrows are common to abundant. Whole to fragments of *Ensis* shell are common to abundant. Thin laminae of silt and very fine silty sand are common. These deposits are commonly found at water depths greater than 45 ft. Deposits range from 1 to 10 ft in thickness. Holocene.

LAGOON DEPOSITS — Ql

Medium-gray to dark-gray clayey silt. Sedimentary structures are rare, consisting of relict burrows or thin laminae of marsh grass fragments or very fine sand. Shells and shell fragments are rare to common. Lagoon deposits grade laterally into marsh deposits and barrier washover deposits. They underlie a portion of the inland bays and the tidal portions of their tributaries, and extend offshore. Holocene.

SINEPUXENT FORMATION — Qsi

Gray, laminated, silty, very fine to fine micaceous sand to sandy silt. The base of the unit is typically a 3- to 5-ft thick zone of bluish-gray to dark-gray clayey silt to silty clay that is interbedded with and grades upward into the sandy silt. In places, the silty clay and the lower portion of the sandy silt are interbedded with a fine to medium sand. In the vicinity of Bethany Beach, the lower sand contains abundant *Mulinia* shells. The Sinepuxent Fm. is interpreted to have been deposited in a lagoonal environment during the late Pleistocene (approximately 80,000 yrs B.P.) (Ramsey, 2010a). Late Pleistocene.

OMAR FORMATION — Qo

Light-gray to gray, silty clay to silty, very fine sand with scattered shell beds. The Omar Formation consists of up to 5 ft of light to dark-gray, basal, pebbly, coarse to very coarse sand that grades upward into 1 to 3 ft of gray to very dark-gray, fine to coarse silty sand with scattered laminae to thin beds of peat composed of sand to gravel-size plant fragments. The sands are overlain by 3 to 5 ft of very dark-gray to black organic-rich sandy silt to silty clay. Above this organic-rich zone, in the areas where the Omar is thickest, 10 to 40 ft of greenish-gray, compact, silty clay to clayey silt is common. The clayey silt grades upward into a gray, to light greenish-gray, silty, gray clay to silty fine sand with scattered laminae to thin beds of *Crassostrea* (oyster) shell. In places, there is a 2- to 10-ft thick bed of medium to coarse relatively clean sand separating the compact clayey silt from the overlying shelly, silty clay. The Omar Formation fills an east-west oriented paleovalley and is comprised of swamp, marsh, and lagoonal sediments deposited during a sea-level highstand at approximately 400,000 yrs B.P. and possibly reworked during the subsequent highstand at 320,000 yrs B.P. (Ramsey, 2010a). Middle Pleistocene.

LYNCH HEIGHTS FORMATION — Qlh

Clean, white to pale-yellow, well-sorted, fine to coarse sand with scattered very coarse to pebble laminae and silty clay laminae overlying light-gray to greenish-gray, compact silty clay with rare laminae of *Mulinia* shells and shell fragments. The silty clay beds grade laterally to well-sorted sands with clay laminae. The deposits were deposited in a lagoon (silty clay with shell) with tidal flats (sand with clay laminae) that was prograded by spit deposits (well-sorted, fine to coarse sand). The lagoonal and tidal flat deposits are considered to have been deposited during a high stand of sea level at approximately 400,000 yrs B.P. (Ramsey, 2010a).

BEAVERDAM FORMATION — Tbd

Heterogeneous unit ranging from very coarse sand with pebbles to silty clay. The predominant lithologies at the surface are white to mottled light-gray and reddish-brown, silty to clayey, fine to coarse sand. Laminae and beds of very coarse sand with pebbles to gravel are common. Laminae and beds of bluish-gray to light-gray silty clay are also common. The sands of the Beaverdam Fm. have a white silt matrix that gives samples a milky appearance when wet. This white silt matrix is the most distinguishing characteristic of the unit and readily differentiates the Beaverdam Fm. from the adjacent cleaner sands of the Sinepuxent Fm. and offshore depositional units. The Beaverdam Fm. is interpreted to be a late Pliocene fluvial to estuarine deposit (Ramsey, 2010a, b). The base of the unit was not encountered within the map area. Late Pliocene.

References Cited

Ramsey, K.W., 2010a, Stratigraphy of the middle to late Pleistocene deposits of Delaware: Delaware Geological Survey Report of Investigations, 43 p.

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Map Credit

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