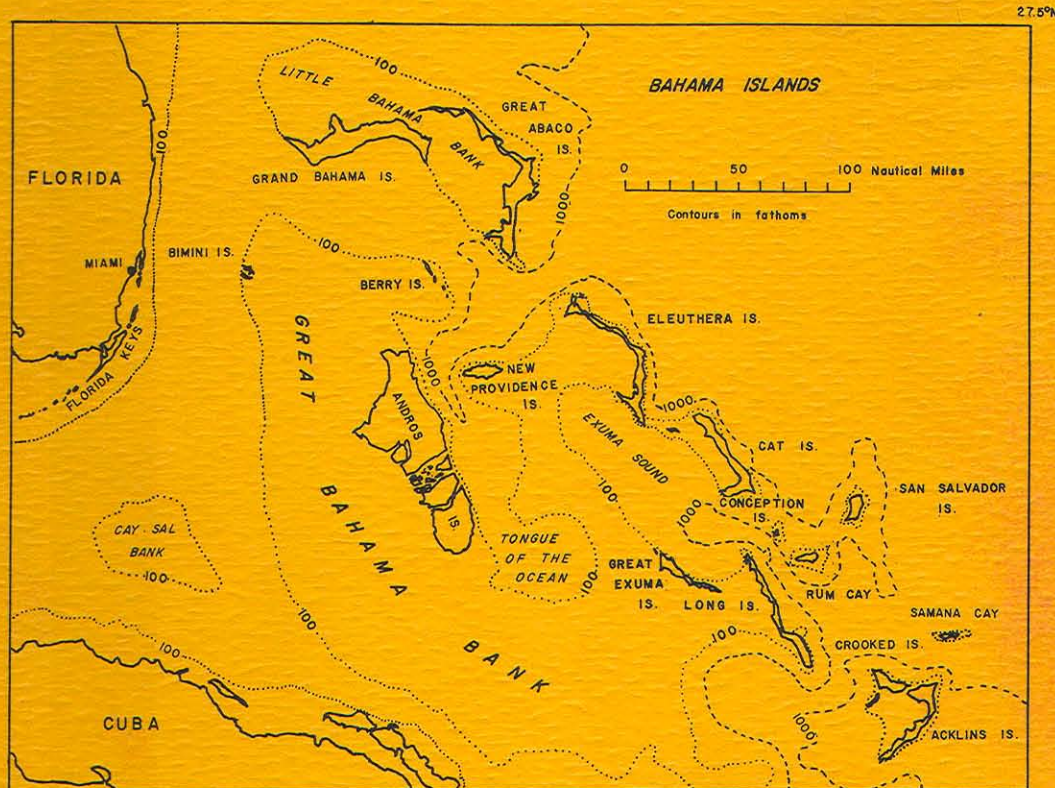


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A PLEISTOCENE ESTUARY AND ITS MODERN ANALOGUE,
SAN SALVADOR, BAHAMAS

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We concur with Hinman (1980) that the crossbedded strata exposed in the north Pigeon Creek quarry represent the foreset beds of a tidal delta similar to that presently forming at the entrance to the Pigeon Creek estuary. Examination of aerial photographs (Fig. 1) and bedrock reconnaissance of the Pleistocene limestones north of Pigeon Creek reveal striking similarities with the present-day Pigeon Creek estuary.

Comparison of the Pleistocene Granny Lake Estuary and the Modern
Pigeon Creek Estuary

Granny Lake (Fig. 1) is the remnant of an estuary which extended much farther south and east. A tidal channel transected this estuary just as in Pigeon Creek presently. The Granny Lake tidal channel can be traced southward to the vicinity of the north Pigeon Creek quarry. Here, the shoreline at the north end of Pigeon Creek exhibits a pronounced southward bulge quite similar to the distal edge of the tidal delta at the entrance to Pigeon Creek. Along the shoreline near the north Pigeon Creek quarry the bedrock contains scattered specimens of Diploria and Montastrea. Similarly, to the west of Pigeon Creek entrance, shallow subtidal bedrock substrates exhibit numerous living specimens of these scleractinians and the red calcareous alga Goniolithon. Lithified beach ridges flank the southern end of

the Granny Lake tidal channel. Numerous, well-defined beach ridges of unconsolidated carbonate sand lie to the west of Pigeon Creek entrance.

History of Development of the Granny Lake and Pigeon Creek Estuaries

A shallow expanded Granny Lake estuary was transected by a slightly deeper tidal channel which terminated southward in a tidal delta now partially exposed in the north Pigeon Creek quarry. Comparable features exist in the present day Pigeon Creek estuary.

The uppermost beds of the Granny Lake tidal delta lie 2-3m above present sea level. If the water over the delta were 1-2m deep, as in the modern Pigeon Creek delta, sea level could have been 3-5m higher than today. Similar water depths probably existed during the growth of the Pleistocene reef at Cockburn Town. We suspect that the Granny Lake estuary formed during the higher sea levels of the Sangamon interglacial (ca. 120,000 years B.P.).

Was Pigeon Creek enclosed, as it is today, during the time of the Pleistocene Granny Lake estuary? We do not think so. Tidal fluctuation at the north end of Pigeon Creek today is approximately 0.2m, considerably less than the approximately 1.0m experienced at the south end. It is difficult to imagine that with such little tidal fluctuation currents would be sufficient to maintain the tidal channel. How wave energy sufficient to produce the beach ridges at the south end of Granny Lake estuary could occur in an enclosed Pigeon Creek is also difficult to



**FIGURE 1:Granny Lake Estuary (Pleistocene)
and Pigeon Creek Estuary (Holocene)**

explain. The corals Montastrea and Diploria, flanking the Granny Lake tidal delta, cannot live in the more restrictive conditions currently present at the north end of Pigeon Creek. Preliminary examination of the ostracode microfauna reveals the presence of species characteristic of shallow open marine environments and unlikely to occur in restricted hypersaline bays such as the north end of Pigeon Creek.

Thus the Granny Lake estuary opened directly into an open marine environment just as the Pigeon Creek estuary does today. The Pigeon Creek estuary formed through isolation by the development of beach-dune ridges between offshore islands, remnants of former dune deposits. The Bluff is an example of a former island which served as a nucleus. High Cay may serve as a future nucleus. Based on the loosely consolidated nature of the beach-dune ridge deposits, we suspect that Pigeon Creek estuary formed after the post Wisconsin rise in sea level.

Summary

The Granny Lake estuary, of presumed Sangamon age, is directly comparable to the present day Pigeon Creek estuary. The Pigeon Creek estuary was isolated presumably after post Wisconsin sea level rise by the growth of beach-dune ridges between offshore islands.

References Cited

- Hinman, E. 1981. Beaches, rocky shores, Pigeon Creek delta and reefs. in Gerace, D. T. (editor) Field Guide to the Geology of San Salvador, p. 106-120. CCFL Bahamian Field Station.