WADING RIVER - THE EVOLUTION AND ECOLOGY OF A NORTH SHORE EMBAYMENT AND ADJACENT PRE-HISTORIC INDIAN SITES.

Herbert C. Mills, Curator of Geology, Nassau County Museum
95 Middleneck Rd., Port Washington, N.Y., 11050.

INTRODUCTION

This study was conducted by Nassau County Museum field crews from 1967-69 at the Wading River marsh. Geological and paleoenvironmental investigations were stimulated by the excavation of archeological sites along the western edge of the marsh under the direction of museum archeologist, Ronald J. Wyatt. The purpose of the combined study was to relate the postglacial physical and ecological evolution of the Wading River embayment to the chronology and lifeways of the adjacent Indian occupations. Also. it was hoped that radiocarbon dates from organic deposits below the marsh surface would provide local data on the postglacial rise in sea level.

By correlating the archeological, geological and biological information it was concluded that the time of occupation of the Wading River aboriginal sites was closely related to the availability of abundant shellfish resources in the adjacent bay. Once marsh development reached the point where shellfish beds were restricted, the site was abandoned. Also, a radiocarbon date from freshwater peat 22 feet below present mean sea level (M.S.L.) was dated at 5695 ± 220 B.P. This was close to sea level dates obtained from New Haven Harbor (Upson, Leopold and Rubin, 1964). The archeological site report was published (Wyatt, 1972), and an exhibit was developed for the Garvies Point Museum in Glen Cove, but this report is the first to describe in some detail the geology and paleoenvironments of the embayment.

DESCRIPTION OF AREA AT TIME OF STUDY

Wading River marsh is located on the north shore of Long Island in Suffolk County about seventy miles from New York City (Manhattan); 40°57'30"N, 72°51'30"W on the U.S.G.S. 7½ minute Wading River quadrangle. The marsh is surrounded on three sides by the hilly uplands of the Harbor Hill terminal moraine with local elevations reaching 200 feet above sea level. The marsh is bounded on the north by a bar of sand and cobbles that faces Long Island Sound. East and west of this bar the shoreline consists of a narrow, rocky beach backed by fifty to one hundred foot high bluffs where the terminal moraine is being eroded by the Sound. East to west littoral currents and waves supply sand for the bar that originally protected a small bay from the open Sound. Sedimentary accumulation in the bay eventually led to the formation of a saltmarsh. The present high marsh has a surface elevation about one foot above the normal high tide and the local tidal range is six feet. Tha marsh surface is dominated by *Spartina patens* (salt meadow cordgrass). *Distichlis spicata* and a variety of other high marsh species are common, and there are dense stands of *Spartina alterniflora* (salt marsh cordgrass) in the inter-tidal zone along the creek banks.

Wading River is a meandering tidal creek that flows in a generally westerly direction. It it joined by four northerly flowing tributaries each originating in small valley indentations in the north face of the moraine. The largest of these is Mill Creek which begins at a fresh water pond in the village of Wading River. Fresh water also enters the tidal creek from several springs around the upland perimeter. At the time of the study there were numerous ditches dug for mosquito control. They divided the marsh surface into an irregular grid that made the location of probes and cores easy and accurate. By 1993, these ditches had been filled in and the *Ira oraria* (marsh elder) shrubs that lined their banks are gone. The adjacent hills are wooded with oaks (red, black, and white), red maple, pitch pine, and eastern red cedar the most abundant tree species. There is also a notable group of three very large granite erratic boulders, called Split Rock, on the hillside along the western margin of the marsh near the Indian sites.

METHODS OF INVESTIGATION

To determine the thickness of the bay and marsh sediments, 225 depth probes (Fig. 1) were made using a Davis (piston-type) peat and marl sampler. The hand-driven sampler easily penetrated layers of organic marsh mat and fine marsh and bay muds. Thin, sandy horizons were also penetrated with some effort, but the corer ground to a halt in a coarse quartz sand that forms the basal layer of the bay/marsh sequence. In fifteen holes (Fig. 2) continuous cores were collected to examine the deposits, and four stratigraphic cross sections were drawn based on these cores (Figs. 3 & 4 a-d). The sediments were dried and sorted to determine particle size distributions, and macroscopic and microscopic examinations of the samples were made to identify organic materials. Finally, a number of samples were processed to extract pollens and spores and a pollen diagram was drawn.

RELATIONSHIP OF BAY ENVIRONMENTS TO INDIAN SITES

Figure 2 shows the contours on top of a medium to coarse quartz sand layer that was deposited throughout most of the bay during the initial flooding of the valley by the sea. In the northern third of the bay, this sand deposition continued behind the spit or baymouth bar until the onset of marsh development. In the deep, sheltered valleys of the inner bay the coarse sand was replaced by fine sands and muds early in the bay's history. The thickest section of bay sediments are found over buried valleys that line up with the present upland indentations. A maximum depth of 41 feet below the marsh surface (-37 feet M.S.L.) (Core R, Fig.4a) was found under the Mill Creek branch of Wading River. Although the deep cores R, P, N and BB (Figs.4a & 4d) record the most complete record of bay development, sediments in nearly all cores contain organic remains that can be used to identify species and reconstruct habitats.

The deposition of mud in the inner bay lasted for several thousand years as evidenced by the 21 feet of accumulation seen in Core R. Between -19 and -30 feet

M.S.L. fragments of scallop (*Pecten irradians*) were found in the core; in Core P they were found up to -13 feet. This shallow water habitat, rich in scallops, is probably what attracted the early aboriginal settlements to the bay's sheltered western margin. A radiocarbon date of 4545 ± 140 C-14 years B.P. was obtained from a shellfish baking/refuse pit in Layer III of the Shoreham site (Wyatt, 1972). This was the lowest, and oldest, of the occupational layers in any of the six adjacent sites.

As the bay developed, open water expanded out of the deep finger-like valleys and the bottom sediments became more sandy. Core samples from about -15 feet to -6 feet M.S.L contain numerous soft clam (*Mya arenaria*) fragments. This indicates that the bay was becoming shallower with expanding tidal flats and a shrinking scallop habitat. The aboriginal deposits show a change in the shellfish percentages with soft clam and hard clam (*Mercenaria mercenaria*) replacing scallops in Layers I and II. Although their diet changed, Indians continued to occupy the sites when soft clams were the dominant shellfish in the bay.

A date of 1165 ± 90 C-14 years B.P. was obtained from charcoal in a soft clam-filled pit from the Cusano site (Wyatt, 1972). This Late Woodland period date is near the end of active occupation of the sites. It also coincides with the time when saltmarsh vegetation was replacing open tidal flats in the bay, and shellfish beds were restricted to tidal creeks. Although there is some evidence of later Indian activity in the area it appears transitory rather than occupational. The evidence linking the occupational use of the area with the availability of abundant shellfish resources in the Wading River embayment is compelling.

RADIOCARBON DATES AND POST-GLACIAL SEA LEVELS

The general process of salt marsh formation is well established (Redfield, 1965), and the local rate of rise of postglacial sea level has been extensively documented (Redfield and Rubin, 1962; Bloom and Stuiver, 1964; Upson and others, 1964; Newman, 1966; Redfield, 1967; Emery and Garrison, 1967). It was possible, therefore, to compare data obtained from this study, with many other regional dates for postglacial sea level elevations.

Near the bottom of Core R, and several cores at the east end of the marsh, the corer penetrated a gummy, red-brown layer identified as freshwater peat. The peat accumulated in small ponds or bogs that were drowned as sea water reached their elevations. Three samples from different elevations were radiocarbon dated to determine approximate dates of accumulation and drowning. Unfortunately, the peat from -35 feet M.S.L. in Core R was too small to obtain a datable sample. Core N penetrated a four foot thick layer of dense freshwater peat between -22 and -26 feet M.S.L.that provided ample organic material for dating. One sample was taken from the top of the layer, -22 to -22.5 feet M.S.L. It provided a date of 5695 ± 220 C-14 years B.P.(Geochron Labs, Cambridge, Ma.). Allowing for compaction of the peat and flooding by mean high water, this date approximates when mean sea level covered the bog. A second peat sample from the same core at -25 feet was dated at 9000 ± 240 C-14 years B.P. This date does not provide information on sea level

elevation at the time but shows that organic accumulation in the small (kettle?) pond occurred for at least 3300 years.

The third C-14 date was from a depth of -5.5 to -6.0 feet M.S.L. in a layer of peat near the bottom of Core V (Fig.4c). The sample date was 2375 ± 180 C-14 years B.P. This figure is compatible with other dates from nearly similar elevations in the Cape Cod, Long Island Sound, and N.Y. Metropolitan area (Newman, 1966; Appendix F).

BRIEF POLLEN HISTORY

Pollen recovered from marsh cores showed oaks (*Quercus*) to be the dominant trees dating back some 6000 years into the warm, moist Atlantic climatic substage (C1 Pollen Zone). Next in abundance were birch (*Betula*), pine (*Pinus*), hickory (*Carya*), black gum (*Nyssa*), hemlock (*Tsuga*), and beech (*Fagus*) with pine and hemlock showing significant increases during the cooling period of the Subatlantic substage (C3a & C3b Pollen Zones) from about 2000 years B.P. to the present. Abundant trees with edible nuts (beech, hickory and oak) provided a seasonal food source for the local Indians to compliment the shellfish from the bay, and the deer and small game that they hunted in the woodlands. Charred nuts and deer and small animal bones are found along with the shellfish middens at the Wading River sites.

CONCLUSIONS

This multi-disiplinary approach to the study of the Wading River embayment and its associated aboriginal sites was successful in reconstructing the local environments over an extended period of human occupation. It also provided probable reasons for the selection of the area as a living site and for its eventual abandonment. Similar studies could be applied to other north shore bays and marshes where there is evidence of Indian occupation.

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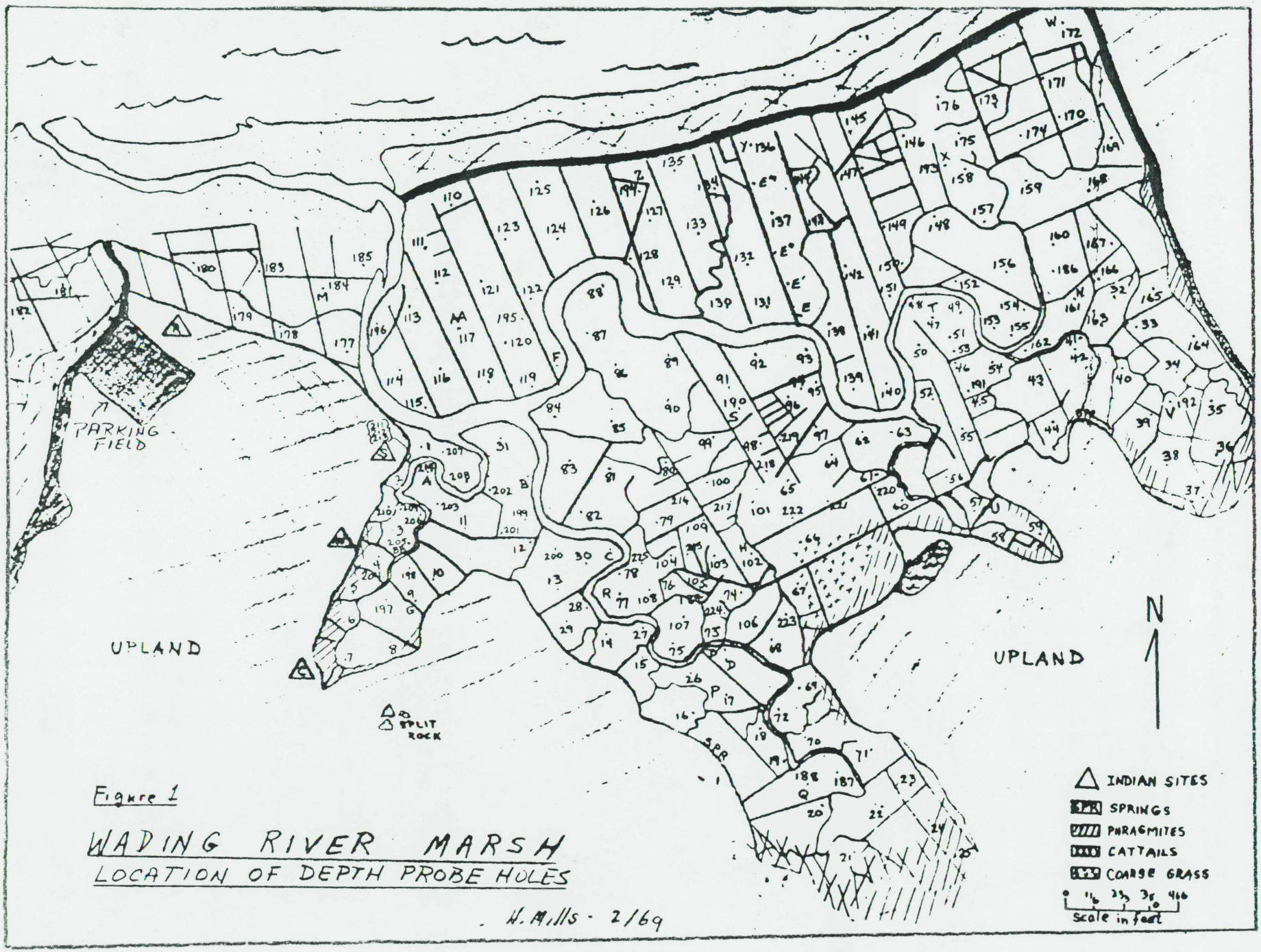

Figure 1

WADING RIVER MARSH

LOCATION OF DEPTH PROBE HOLES

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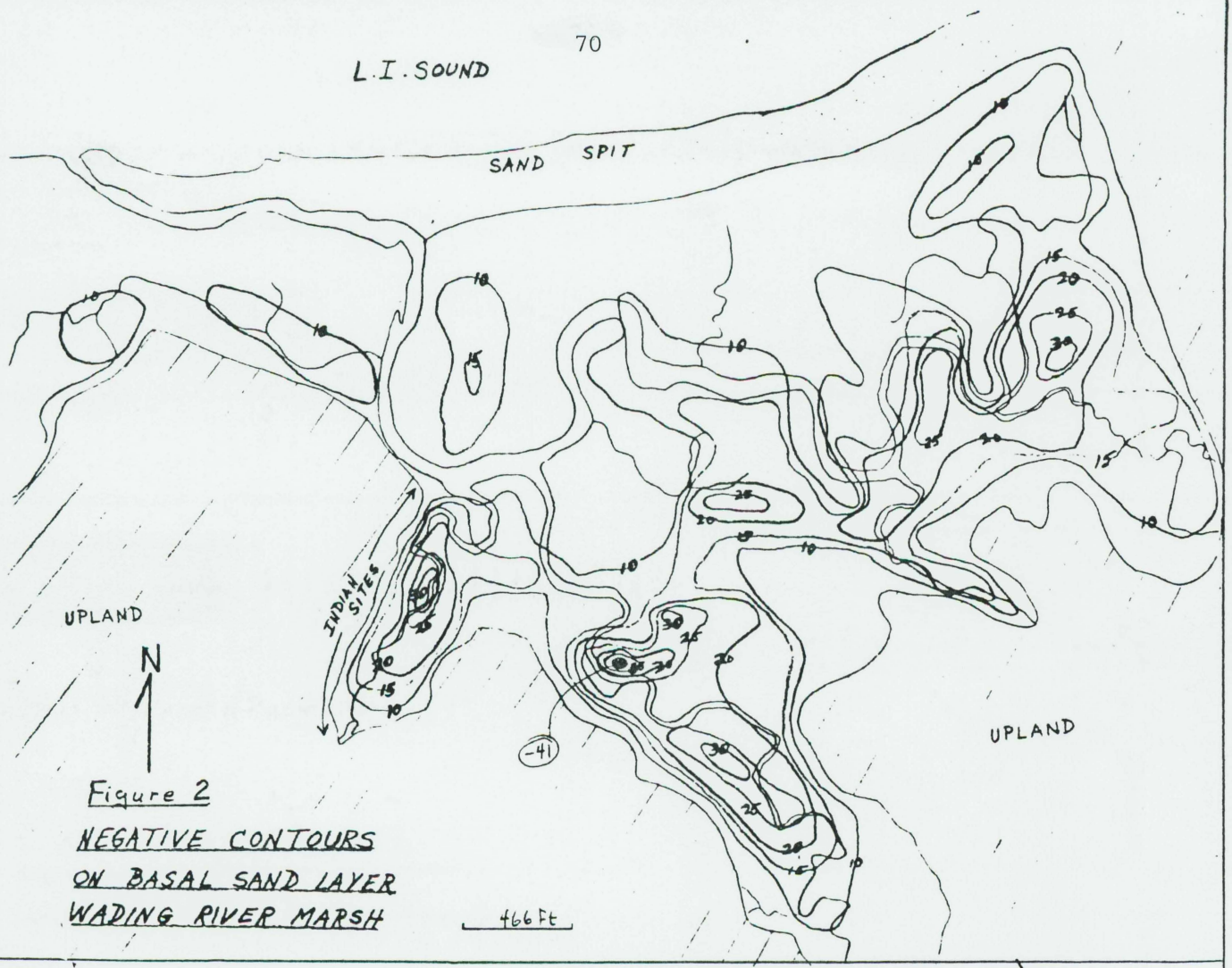

Figure 2

NEGATIVE CONTOURS
ON BASAL SAND LAYER
WADING RIVER MARSH

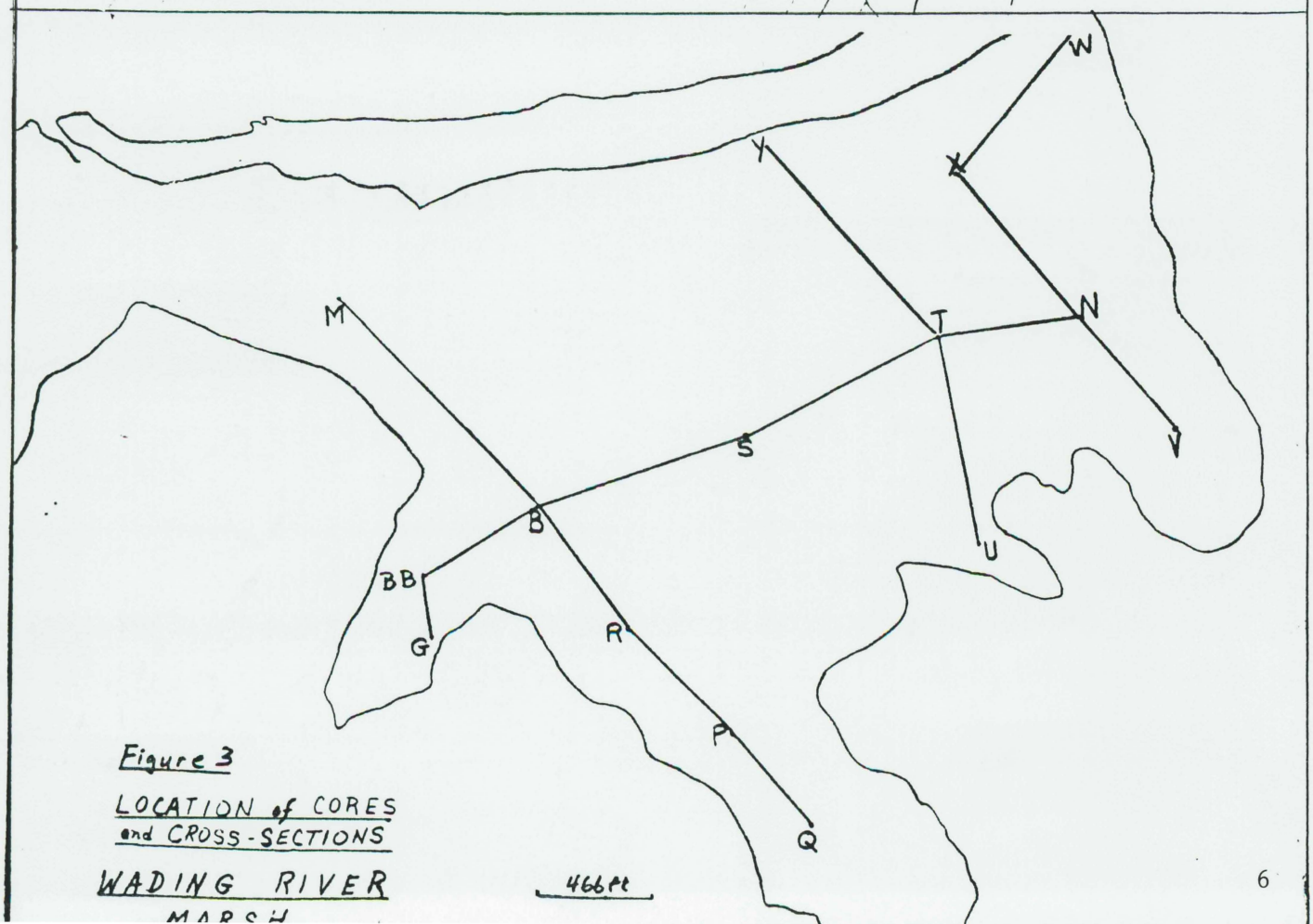

Figure 3

LOCATION of CORES
and CROSS-SECTIONS

WADING RIVER
MARSH

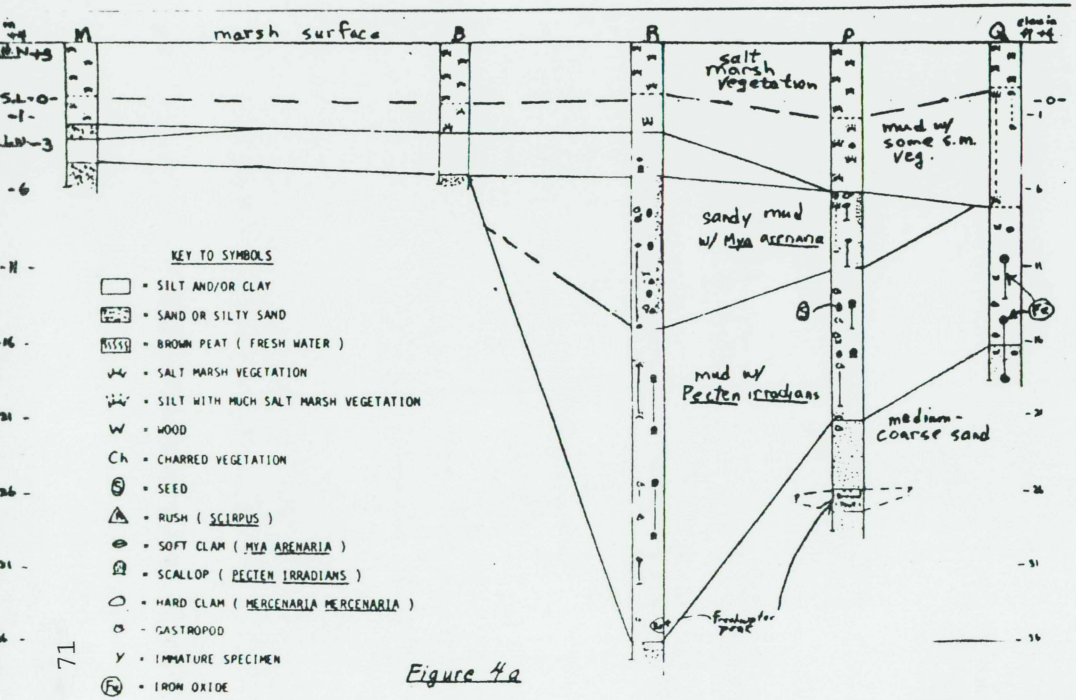

Figure 4a

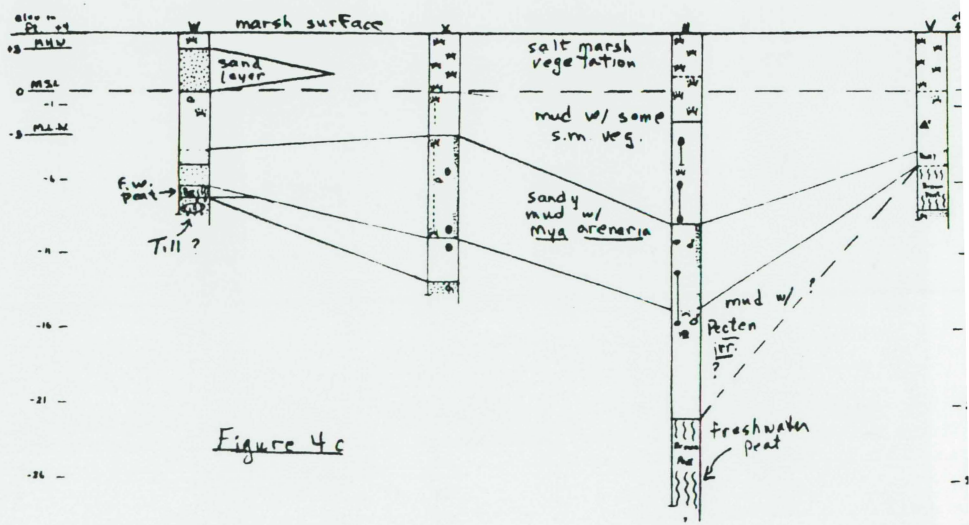

Figure 4c

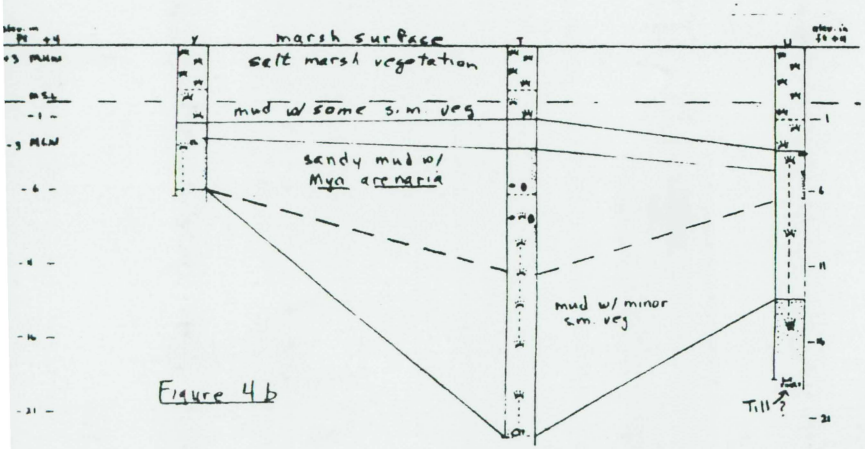

Figure 4b

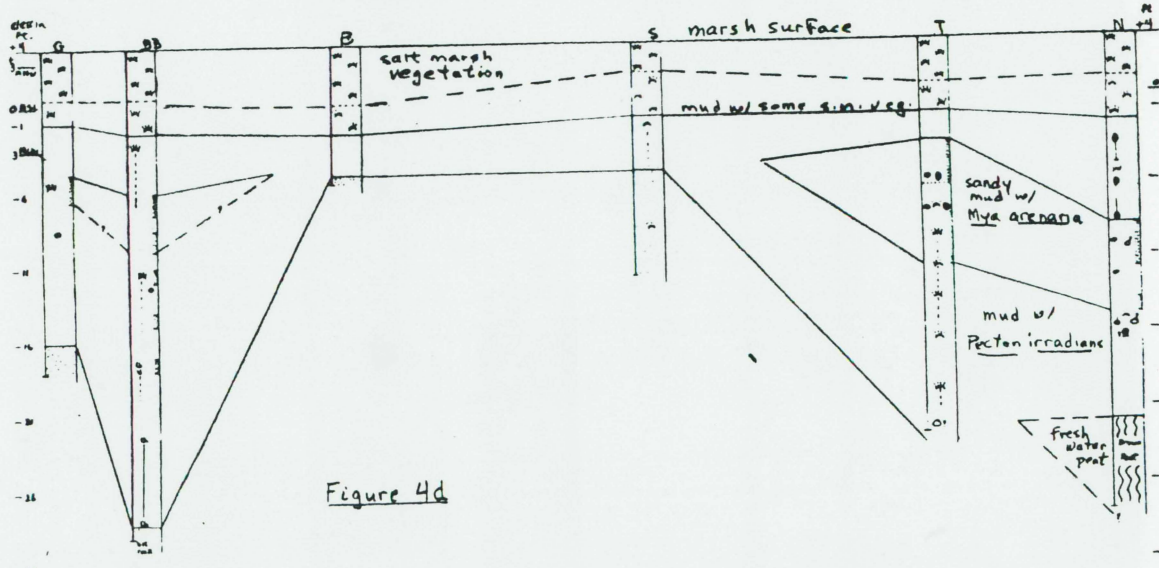

Figure 4d