

DESCRIPTION OF MAP UNITS

- Artificial fill**  
Heterogeneous unstratified materials such as sand, gravel, clay, slag, construction debris, and dredge spoil. Only major areas of filled or highly disturbed ground have been mapped.
- Alluvium**  
**Interbedded sand, gravel, and silt-clay.**  
Sand, quartzose, fine- to coarse-grained, variably clayey; includes some pebbly sand and fine to coarse quartz gravel. Silt-clay beds thin, lenticular, in places bearing logs, twigs, and leaves, and rarely thin peats. Color tan, gray, or brown.  
Alluvium includes heterogeneous, moderately- to poorly-sorted sediments underlying floodplains and channels of streams in the quadrangle. These sediments are generally water-saturated and loosely consolidated in lenticular, internally massive beds. Also mapped under this heading are two large areas of beach sand and associated marsh making up Cove Point and Flag Ponds. Each of these large areas is a complex of successive beach ridges comprised of loose, cross-stratified sand. The ridges are backed by extensive tracts of marsh, particularly in the case of Cove Point.  
Although radiocarbon dates are not available to document the age of these deposits, they are generally ascribed to fluvial, estuarine, or wind deposition during the last 10,000 years. In general, alluvium is thin, less than 25 feet (7.6 m).
- Quaternary Lowland deposits (undivided)**  
**Interbedded sand, silt-clay, and minor pebbly sand.**  
Sand, fine- to coarse-grained, variably clayey, with subordinate pebbly sand and thin gravels near base of unit. Sand mostly poorly-sorted and clayey; fine to medium clean sand much subordinate. Sediment color is tan, gray-green to dark gray; silt-clay is dark with plant fragments in places. Fossiliferous in places; fauna dominated by modern mollusks. Oysters make up most of the fauna in some beds.  
Included in this informal map unit are some deposits that were identified as fluvial terrace deposits flanking the Patuxent River on the Calvert County geologic map (Glaser, 1994). Lowland deposits are made up largely of detritus eroded from the adjoining highland areas, redeposited by the ancestral Patuxent River as fluvial or estuarine sediments. Thus, they range from freshwater to brackish in environment of deposition. Sediments presumed to be correlative to the Lowland deposits elsewhere in the Chesapeake Bay area range in age from 24,000 to as old as 180,000 years (e.g., McCartan, 1989).  
These sediments collectively lie at 60 feet (18.3 m) or less in elevation. The thickness of these sediments ranges from less than 5 feet (1.5 m) to a maximum of 50 feet (15.2 m).
- Terrace deposits**  
**Sand and gravel.**  
Sand, quartz, fine- to medium-grained, with thin beds of fine to medium quartz gravel. Color white, pale-gray, or brown. Thin flat bedding prevalent, cross-bedded in places or massive.  
In this quadrangle, Terrace deposits comprise a discontinuous series of small fluvial terraces flanking St. Leonard Creek, most terrace surfaces at 40 feet (12.2 m) or less in elevation. These mostly sandy sediments show minimal oxidation and are relatively young, probably Quaternary in age. They are the record of valley cutting by St. Leonard Creek and channel deposition. The terraces are underlain by as much as 35 feet (10.7 m) of sediment.  
*Note: The relationship between the ages of the Terrace deposits and the Lowland deposits is not well defined. These units may represent coeval deposition in some places and not in others.*
- Upland deposits (former Brandywine Formation)**  
**Sand, gravel, and minor silt-clay.**  
Sand, quartzose, medium- to coarse-grained, poorly-sorted, pebbly in places, interstratified with many thin beds of fine gravel. Pebbles consist of vein quartz, sandstone, and chert. Silt-clay beds rare. Sand is tan, yellow, and reddish-brown; clay is buff, pale gray, and/or red. Bedding lenticular, cross-bedded; rarely massive or flat-bedded.  
The unit occupies dissected upland areas of the quadrangle. The base of the unit lies at about 100 feet (30.5 m) elevation across the northern tier of the map area, declining to 80 feet (24.4 m) or less in the south. Exposures are relatively poor in the quadrangle except for a few deep road cuts and stream valley walls. Where intact, the formation sand and gravel capped with as much as 15 feet (4.6 m) of reddish-brown massive sandy loam bearing "floating" pebbles. The base of the unit is erosional on the Choptank-St. Marys part of the Chesapeake Group, but the contact is obscure where similar light-colored sand with gravel comprises the uppermost St. Marys.  
The Upland deposits are typically fluvial in origin, generally regarded as a channel-floodplain couplet laid down by a river or rivers, probably the ancestral Potomac during late Miocene or Pliocene time (e.g., Hack, 1955; Schlee, 1957; Glaser, 1971). Unit thickness is as much as 40 feet (12.2 m), but generally less.
- Choptank and St. Marys Formations**  
**Sand, sandy clay, and clay.**  
Sand, quartzose, fine- to medium-grained, variably clayey, interbedded gradually with clay and sandy clay. Sand dark-gray to gray-green where unweathered; pale-gray or yellow to whitish where weathered and in uppermost St. Marys Formation. The latter contains beds of coarse quartz sand, granule beds, and thin pebbly layers. Choptank and lower St. Marys strata are variably fossiliferous, peaking in two thick shell-packed sand units - the Drumcliff and Boston Cliffs Members - in the Choptank.  
The Choptank-St. Marys contact is a sand-on-sand discontinuity, which is unapparent outside of the type section, and consequently, the two formations are mapped as a single unit. Similarly, the contact between the Choptank and the underlying Calvert is within a sequence of similar muddy sands, also untraceable inland from the type section. Consequently, the lower contact of the Choptank is herein repositioned to the base of the Drumcliff Member, a horizon, which has proved mappable throughout the map area. (This is in agreement with the base of the unit as defined by Kidwell (1984) and the Calvert County geologic map (Glaser, 1994) but differs from some other earlier workers (e.g., Gemant, 1970, 1971; Gibson, 1971).) Moreover, the St. Marys Formation has been expanded to include sandy strata heretofore included in the Upland Deposits. Thus, the repositioned St. Marys-Upland Deposits contact now lies at the base of the generally coarser-grained oxidized sand and gravel section exhibiting fluvial sedimentary structures.  
The typical Choptank-St. Marys section in the map area is as follows. The basal Choptank consists of 8 to 30 feet of pale yellowish-brown, fine-grained, well-sorted, sand (Drumcliff Member) containing conspicuous layers of molluscan shells dominated initially by large *Lagodon*. Overlying the Drumcliff is about 20 feet (6.1 m) of fine-grained, dusky-blue muddy sand with few fossils (St. Leonard Member). The St. Leonard is succeeded by the Boston Cliffs Member, which is about 15 feet (4.6 m) thick. The Boston Cliffs Member is similar to the Drumcliff in both lithology and fossil content. The top of the unit is oxidized and limonite-cemented, suggesting subaerial exposure. Overlying the Boston Cliffs Member is a variable sequence of gray to gray-green, fine to medium-grained, muddy to clean sand, interbedded with dark-gray silty to plastic clay (Conoy Member and lowest St. Marys Formation). Bands of fossils, rich in gastropods, are scattered throughout the sand. This sequence grades upward to predominantly dark-gray clay with lenses of laminated silt faced with well-defined burrows, interbedded with well-sorted non-fossiliferous sand. The sands grade upward into a few tens of feet of pale-gray to yellow or orange sand, fine- to coarse-grained, locally with pebble bands and thin lenticular pale-gray clay lenses. These beds are marked by *Ophiomorpha* burrows, diagnostic of the shoreline environment. The contact with the overlying Brandywine Formation is marked locally by a line of cobbles.  
The Choptank-St. Marys section is overall a marine regressive sequence and records environments ranging from shallow marine shelf in the Choptank, to nearshore and marginal marine facies in the upper St. Marys. Within the overall regressive trend, however, several lesser transgressive-regressive cycles are indicated within the Choptank Formation (e.g., Kidwell, 1984; Gemant, 1970). The Choptank and St. Marys Formations are considered middle Miocene in age. The thickness of the combined section is 150 feet (45.7 m) at maximum.

Base map from U.S. Geological Survey  
7.5-minute Series (Topographic)  
Cove Point, MD, 1985  
1987 magnetic north declination (center of sheet): 10 degrees west  
(To determine current magnetic declination see: <http://www.ngdc.noaa.gov/cgi-bin/veg/gmag/1dmonth.pl>)  
Note:  
Hydrology layer shown is from USGS digital line graphs (DLG) for this quadrangle  
Topography and cultural/transportation layers from USGS stable-base film separates  
Topography by photogrammetric methods from aerial photographs taken 1981.  
Field checked 1992. (Base map edited 1987.)

Current map projection:  
Maryland State Plane Coordinate System 1987  
(Projection: Lambert Conformal Conic, 1980 geodetic reference system)  
(Horizontal Datum: North American Datum 1983)  
State Plane 2000-meter ticks, grid lines and coordinates shown in black  
Geographic coordinates (latitude/longitude) shown at 2.5' intervals in black

Geologic Map of the Cove Point Quadrangle,  
Calvert County, Maryland

By  
John D. Glaser  
2003

STATE OF MARYLAND  
Robert L. Ehrlich, Jr.  
Governor  
Michael S. Steele  
Lieutenant Governor



DEPARTMENT OF NATURAL RESOURCES  
C. Ronald Franks  
Secretary  
W. P. Jensen  
Deputy Secretary  
MARYLAND GEOLOGICAL SURVEY  
Emery T. Cleaves  
Director

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Supplemental Information

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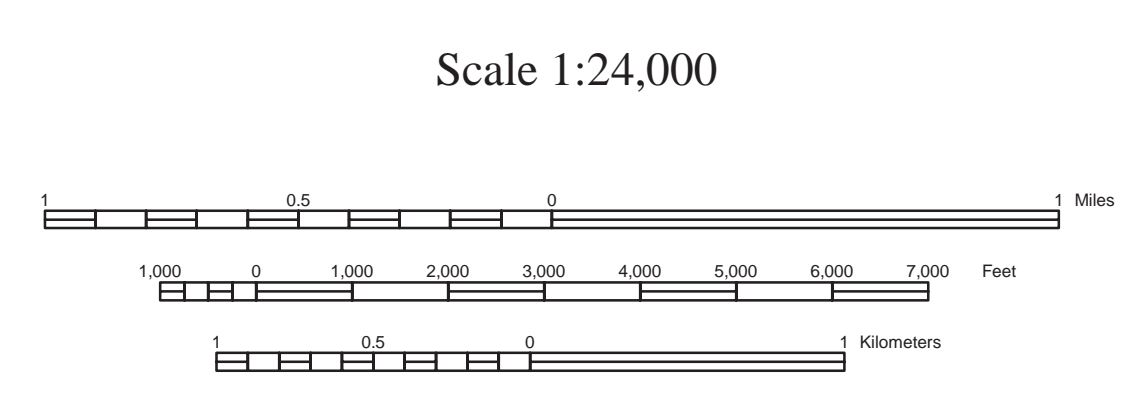
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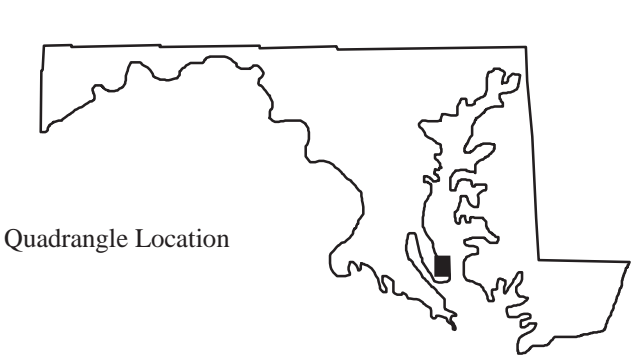
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Adjoining 7.5' Quadrangle Names Cove Point Quadrangle, shaded							
1	2	3	4	5	6	7	8
1. Prince Frederick 2. North of Cove Point 3. Sharpes Island 4. Boroones Island 5. Taylores Island 6. Hollywood 7. Solomons Island 8. Barren Island							

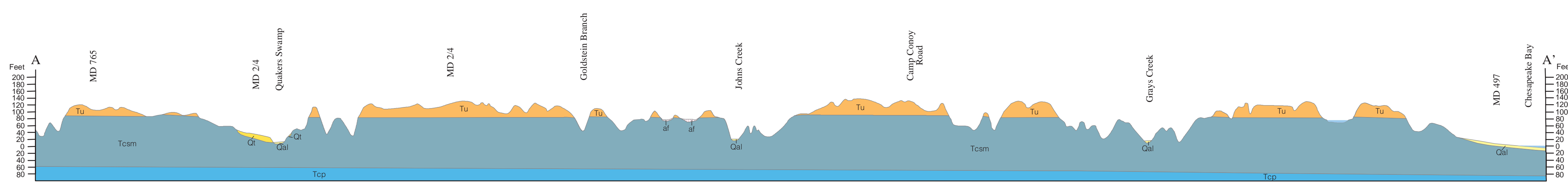


- Explanation of Map Symbols**
- Topographic and Hydrologic Symbols**
- Topographic Contour - Index (50-ft interval)
  - Topographic Contour - Intermediate (10-ft interval)
  - Stream
  - Water body (including lakes, ponds, streams)
  - Marsh, wetland, swamp, or bog



Contour Interval 10 Feet  
National Geodetic Vertical Datum of 1929  
Shoreline represents the approximate line of mean high water  
The mean range of tide is 1.3 feet  
(To convert from feet to meters, multiply by 0.3048)

CROSS SECTION A-A'  
Vertical Exaggeration 10x



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