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Comments

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A PRELIMINARY INVESTIGATION OF THE BENTHONIC MARINE ALGAE OF THE CHESAPEAKE BAY REGION

ARTHUR C. MATHIESON AND STEPHEN W. FULLER[1]

Few studies have been conducted upon the benthonic marine algae of Chesapeake Bay. Zaneveld (1966a) described the Cyanophyta flora of the area (i.e. between Cape May, New Jersey, and Cape Hatteras, North Carolina), but no systematic account of the other divisions is recorded. Zaneveld and Barnes (1965) described the reproductive periodicity of several species of seaweeds from the lower Chesapeake Bay. Wulff et al. (1968) have described the summer marine algae from a jetty on the open coast at Ocean City, Maryland.

In the present paper we summarize the species found at 63 stations on the Chesapeake Bay and the Patuxent River (see Fig. 1 and Tables I-III for details of locations). All collections were made by the junior author in connection with a summer (1968) marine botany course given at the Chesapeake Biological Laboratory of the University of Maryland.

The Bay is characterized by brackish waters and a lack of stable substrate. At most stations the bottom was sandy, but muddy areas were also evident. Seaweeds were attached to scattered boulders, pebbles, shells, pilings, cement blocks or other solid substrates. The surface water salinities ranged from 18.1 o/oo in the lower Bay to 3.4 o/oo in the upper Bay, and to 1.9 o/oo in the upper Patuxent River. The surface water temperatures at the same locations ranged from 24.8 to 30°C — most readings being near 27°C. The greatest temperature difference between the surface and bottom levels of water (35 feet in depth) was 2.5°C.

Several shore collections were made at the mouth of the Patuxent River from June 26 to August 7, 1968, (Fig. 1

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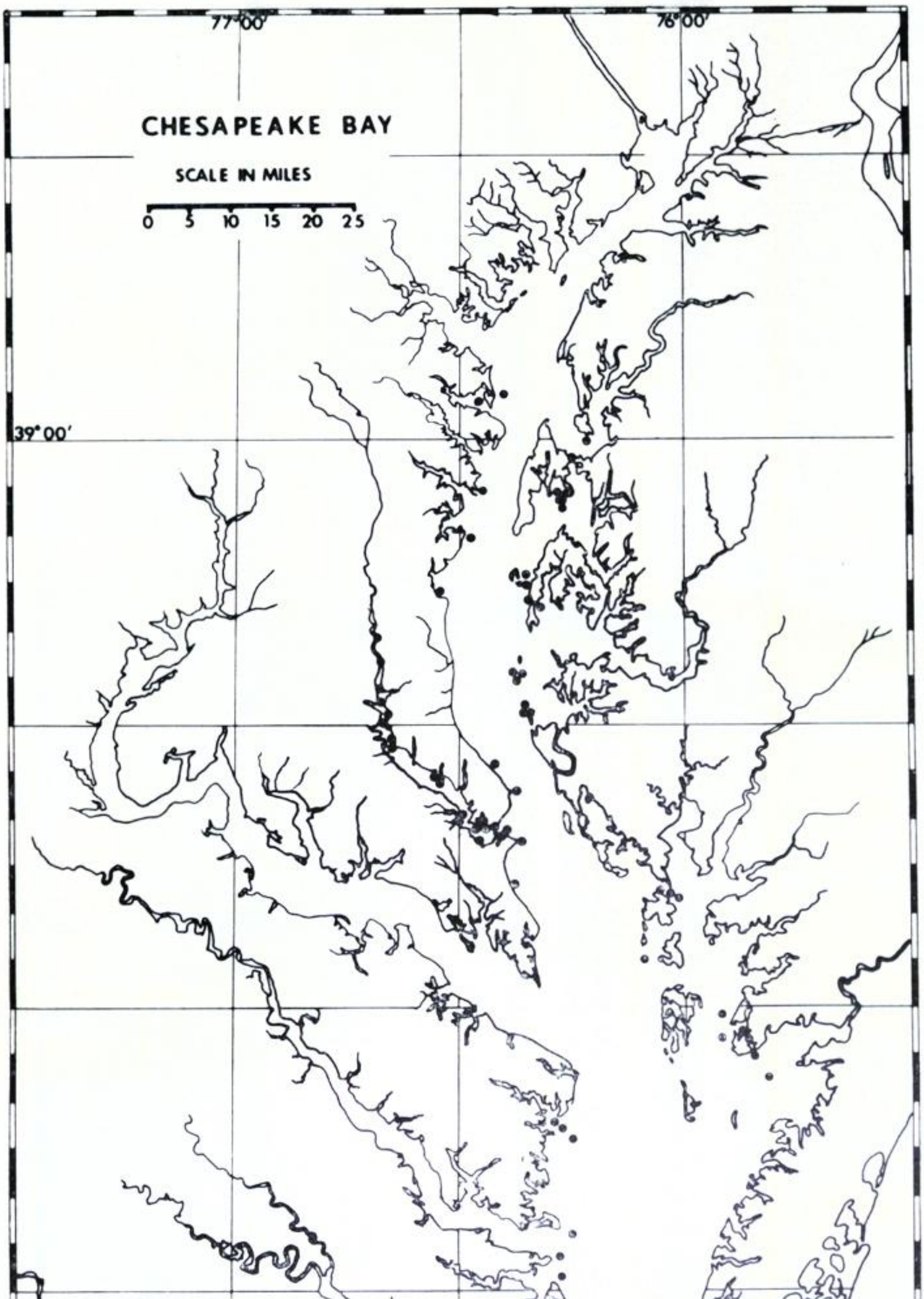

Fig. 1. Chesapeake Bay and Patuxent River Stations.

and Table I). Offshore collections were made in the Bay on July 1, 8, 19 and 25, 1968 (Table II) and the Patuxent River on August 7, 1968 (Table III). The offshore collections were made aboard the motor vessel Orion or the Bluefish. Samples were obtained with a steel frame trawl or with oyster tongs. Herbarium voucher specimens were made for all conspicuous species at each station. A complete set of specimens is deposited in the Herbarium of the University of Maryland, while a partial set has been deposited in the Algal Herbarium of the University of New Hampshire. The nomenclature of the recent British Checklist (Parke and Dixon, 1964) has been applied in most cases.

List of Species

CHLOROPHYTA

Cladophorales

*__Cladophora flexuosa__ (O. F. Müller) Harvey
(Equals *C. sericea* (Hudson) Kützing sensu van den Hoek)
Dredged in 5 feet of water at station F-5.

*, †__Cladophora flexuosa__ (Dillwyn) Harvey f. __densa__ Collins
Found floating at station A-7. Previously recorded from Rhode Island (Collins, 1902).

*, †__Cladophora gracilis__ (Griffiths *ex* Harvey in Mackay) Kützing
Equals *C. sericea* (Hudson) Kützing sensu van den Hoek)
Attached to rocks at stations A-9 and A-10. Dredged with *Zostera marina* at station B-5. Previously recorded from New Jersey to Newfoundland (see Taylor, 1957, for references).

*__Rhizoclonium riparium__ (Roth) Harvey
Found once attached to pier pilings at station A-1.

Ulotrichales

*__Enteromorpha clathrata__ (Roth) J. Agardh
Entangled amongst *Zostera marina* at station A-3.

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*Indicates a new record for Maryland.
†Indicates a southern extension of range on the Northeast Coast of North America.

Enteromorpha intestinalis (L.) Link
Found unattached at stations A-3 to A-7, A-9, A-10, B-9, C-12, E-3, E-4, F-2, and F-5. Found attached (rocks, shells or logs) at stations A-3, A-6 and A-7.
Enteromorpha minima Nageli
(Equals *Blidingia minima* (Nageli *ex* Kützing) Kylin)
On pier pilings at station A-4 and on rocks at station A-6.
Enteromorpha prolifera (O. F. Müller) J. Agardh
Found once on pier pilings at station E-3.
*__Monostroma oxyspermum__ (Kützing) Doty
Found once on a rock wall at station A-6.
*__Pseudendoclonium marinum__ (Reinke) Aleem *et* Schulz
(Equals *Protoderma marinum* Reinke in Taylor, 1957)
Found on rocks at stations A-7 and A-8.
*, †__Ulothrix flacca__ (Dillwyn) Thuret in Le Jolis
Found on pier pilings at stations A-1 and A-4 and on rocks at station A-7. Previously recorded from New Jersey to Baffin Island (see Taylor, 1957, for references).
Ulva lactuca L.
Found unattached and free-floating at stations A-3, A-4, A-6, A-8, A-10, B-1, B-5, B-9, C-1, C-4, C-5, C-6, C-8, C-12, E-1, E-2 and E-3. Attached to rocks or shells at stations A-3 and A-6.

RHODOPHYTA

Nemalionales

*__Acrochaetium flexuosum__ Vickers
Found as an epiphyte on *Zostera marina* at station F-5.
*, †__Trailliella intricata__ (J. Agardh) Batters
Common as an epiphyte on *Ceramium strictum*, *Polysiphonia harveyi*, *Zostera marina* and other species. Present at stations B-1, B-2, B-3, B-5, B-6, and B-10. According to Harder (1948) *T. intricata* is the tetrasporophyte generation of *Asparagopsis hamifera*. *T. intricata* was previously recorded from Long Island to Newfoundland (see Taylor, 1957, for references).

Rhodymeniales

Champia parvula (C. Agardh) Harvey
Dredged at stations B-3, B-4, B-5, B-6 and B-8.

Gigartinales

Agardhiella tenera (J. Ag.) Schmitz
Dredged at station D-3.

Gracilaria verrucosa (Hudson) Papenfuss
Dredged or in drift at stations A-8, A-10, B-1, B-2, B-3, B-4, B-6, B-8, B-11, C-4, C-7, C-8, C-12, D-1, D-3, E-1, E-2, and E-4.

Ceramiales

Ceramium rubrum (Hudson) C. Agardh
Epiphyte on *Gracilaria verrucosa*, *Zostera marina* and other plants — only occasionally unattached. Present at stations A-3, A-6, A-10, B-1, B-2, B-3, B-4, B-5, B-8, B-9, B-11, C-4, C-7, C-8, C-12, D-1, E-3, E-4, and F-5.

Ceramium strictum Harvey
A common epiphyte on *Gracilaria verrucosa*, *Zostera marina* and *Ceramium rubrum*. Present at stations A-3, A-6, A-7, A-10, B-1, B-2, B-3, B-4, B-5, B-6, B-8, B-9, B-11, C-6, C-8, C-12, D-1, F-2, and F-5.

Dasya pedicellata (C. Agardh) C. Agardh
Found unattached at stations A-10, C-3, C-4, C-5, C-6, E-1 and F-2.

Polysiphonia harveyi Bailey
Found unattached at stations A-6, A-7, A-10, B-1, B-5, B-8, B-9, C-4, C-5, C-6, C-7, C-8, C-12, D-1, E-1, E-2 and E-3. Epiphytic on *Zostera marina* and other aquatic flowering plants at stations E-4, F-2 and F-5.

Spyridia filamentosa (Wulfen) Harvey in Hooker
Found unattached at stations B-2 to B-7, B-10, B-11 and D-1. Found as an epiphyte on *Zostera marina* at station B-1 and on *Ceramium strictum* at station D-1.

PHAEOPHYTA

Sphacelariales

*__Sphacelaria fusca__ (Hudson) C. Agardh
Found once epiphytic on *Zostera marina* at station F-5; mixed with *Acrochaetium flexuosum* and *Enteromorpha intestinalis*.

Of the 23 taxa of marine algae found in the Chesapeake Bay and Patuxent River, 11 are new records for the state

of Maryland and 4 are southern extensions of known distributional ranges. Only one species of brown algae was recorded by us, although a few others are known for the lower Bay (Zaneveld and Barnes, 1965). The paucity of vegetation in the area is primarily related to low salinities and a lack of stable substrate. The biomass and diversity of species in the Chesapeake Bay is much less than in estuarine areas of New England (e.g. Great Bay, New Hampshire, or Penobscot Bay, Maine), where fucoid and green algae dominate. More detailed seasonal investigations in the Chesapeake Bay will no doubt reveal additional species which are known for the vicinity (Wulff et al., 1968; Wulff and Webb, 1969; Zaneveld, 1965, 1966b).

We would like to express our gratitude to the faculty, staff and students at the Chesapeake Biological Laboratory of the University of Maryland, who assisted the junior author in collecting specimens and hydrographic data. Particular appreciation is extended to Dr. R. W. Krauss, who directed the summer (1968) marine botany course, and to Miss Jean Snider who supplied temperature and salinity information for the Patuxent River stations.

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Table I. Shore Stations

Station #	Location
	June 26 to August 7, 1968
A-1	Pilings at Chesapeake Biological Laboratory boathouse
A-2	Pilings at Chesapeake Biological Laboratory pier
A-3	Beach on s. shore Patuxent R., just w. of entrance to Naval Station seaplane harbour
A-4	Drum Point, mouth of Patuxent River
A-5	#5 beacon, mouth of Patuxent River
A-6	Rock retaining wall on Naval Base property, s. shore of Patuxent River
A-7	Abandoned Cedar Point Light House
A-8	Beach midway between Cedar Pt. and Point No Point — south of Patuxent River mouth
A-9	Cove Point, just north of Patuxent mouth
A-10	Beach north of Cove Point

Table II Bay Stations

Station #	Location	Salinity 0/00 Sfc	Salinity 0/00 Bottom	Temperature °C Sfc	Temperature °C Bottom	Depth of Bottom
	July 1, 1968					
B-1	Holland Str. off So. Marsh Is., near #2 beacon	11.5	12.0	28	27	10′
B-2	Midway between #9 beacon and James Is. Lt. off Chrisfield	15.0	15.1	27.3	26.0	85′
B-3	Great Rock Oyster Bar, 3000 yds. so. of James Is. Lt.	15.2	15.3	26.7	26.5	20′
B-4	Little Annemessex River at mouth of Battle Creek	16.4	16.4	28.6	27.6	12′
B-5	Midchannel in Broad Creek (connects Little Annemessex R. and Pocomoke Sound)	16.8		28.4		6′
B-6	Pocomoke Sound, off Broad Creek	16.1	16.1	29.0	28.8	12′
B-7	Pocomoke Sound, Va., near red nun #6	16.7	16.5	27.6	27.1	
B-8	Shark Fin Shoal, east of Bloodsworth Island	13.0	13.1	27.1	27.6	9′
B-9	1.5 miles east of Bloodsworth Island	13.2	13.2	28	27.9	10′
B-10	Between red nun #4 and Hooper Strait Light	12.6	12.4	28.2	28.3	12′
B-11	Mouth of Patuxent R. near Obstruction Buoy, w. of Drum Pt.	10.4	10.7	27.3	26.3	6′
	July 8, 1968					
C-1	1.25 miles s.w. of red nun #66, 170° off Sharps Is. Lt.	7.6	14.8	25.0	22.7	35′
C-2	1 mi. so. of red nun #66, off Sharps Is. Lt.	8.1	8.8	24.8	24.9	20′
C-3	1300 yds. e. of red nun #66, off Sharps Is. Lt.	8.3	9.1	25.3	25.2	12′
C-4	Between Poplar Is. Narrows Lt. and can #1	7.4	7.9	26.0	25.9	10′
C-5	900 yds. e. of Coaches Island	8.1	8.5	26.0	25.3	10′
C-6	Mouth of Crab Alley Bay, 900 yds. off Parson Is. & 1800 yds. off Bodkin Is.	8.7	8.4	26.5	26.2	6′
C-7	Crab Alley Bay, between can #1 and Bodkin Is.	8.6	8.5	27.4	26.1	6′

Station #	Location	Salinity 0/00 Sfc	Salinity 0/00 Bottom	Temperature °C Sfc	Temperature °C Bottom	Depth of Bottom
C-8, 9, & 10	Three drags successively further s.e. of "C-7"	9.1	8.8			20′
C-11	4400 yds. w.n.w. of James Is., which is just n. of Taylors Is.	8.3	9.5	26.3	25.6	20′
C-12	Channel between James Is. and red nun #2; 3 drags: 10′, 16′, 6′	9.0	9.1	26.8	26.9	6′
	July 19, 1968					
D-1	Mobjack Bay, 2600 yds. n.w. of can #3, 1200 yds. off Guinea Marsh	18.1	18.2	29	28.7	8′
	3 other drags: 1000 yds. off Guinea Marsh					6-7′
	1500 yds. off Guinea Marsh					10′
	2300 yds. off Guinea Marsh					23′
D-2	2700 yds. w. of Wolf Trap Lt., 1900 yds. off shore					8-12′
D-3	Gwynn Is., 300 yds. inshore of #1 beacon					18- 8′
D-4	Just inside Stingray Point Lt.					8′
D-5	1400 yds. w. of Windmill Pt. Lt.					10′
D-6	Just off Dameron Marsh, 1400 yds. w. of #1 beacon					10′
D-7	Fleet Pt. Bar					12′
D-8	Off Dameron Marsh, 1800 yds. off Greater Wicomico R. Lt.			29		12′
	July 25, 1968					
E-1	E. of Knapps Narrows, 500 yds. n.n.e. of beacon	10.1	10.1	28.9	28.8	5-8′
E-2	W. of Knapps Narrows, 300 yds. n. of beacon	10.1	10.2	28.5	28.5	9′
E-3	Kent Narrows, plants found floating & on pilings at Piney Narrows Marina					

Station #	Location	Salinity 0/00 Sfc	Salinity 0/00 Bottom	Temperature °C Sfc	Temperature °C Bottom	Depth of Bottom
E-4	Chester River, 800-1000 yds. off Cedar Pt.	7.5	7.7	29.6	28.5	5′
E-5	400 yds. off Gibson Is.	3.4				10-15′
E-6	Sillery Bay			30	27.5	10′
E-7	Thomas Point Shoals					6-9′
E-8	Cedar Hurst, 2400 yds. offshore					5-6′
E-9	Hering Bay, Parkers Shoal Light	10.8	10.7	28.9	28.7	5′

Table III Patuxent River Stations

Station #	Location	Salinity 0/00 Sfc	Salinity 0/00 Bottom	Temperature °C Sfc	Temperature °C Bottom	Depth of Bottom
	Samples collected August 7; Temperatures and Salinity recorded August 20, 1968					
F-1	Off Hog Pt., mouth of river	13.1	16.9	29.3	26.6	45′
F-2 & F-3	Two drags were taken 250 yds. off Half Pone Pt. T & S recorded midchannel between Half Pone Point and Point Patience	12.6	16.8	29.8	26.3	100′
F-4	200 yds. s. of beacon #16 off Broomes Is.	11.5	11.6	30.3	29.1	50′
F-5	200 yds. w. of Broomes Is.					
F-6	100 yds. e. of can #2 off Sheridan Pt.	10.6	11.4	30.5	29.5	35′
F-7	250 yds. n. of Sheridan Pt.					
F-8	100 yds. s. of red nun #26, off Hallowing Pt.	9.5	10.0	29.2	28.7	50′
F-9	200 yds. off Craney Creek, Hallowing Pt.					
F-10	Pilings at Power Station, Chalk Pt. The T & S were recorded 100 yds. n. of red nun #30	8.1	8.9	30.2	29.5	17′
F-11	100 yds. off Trueman Pt. The T & S were recorded 400 yds. off the Point	5.4	6.3	29.2	29.1	15′
F-12	Overhead power cables midway between Holland Cliff and Cocktown Cr.	1.9	2.2	28.4	28.1	20′ 30′
F-13	Off Lower Marlboro					