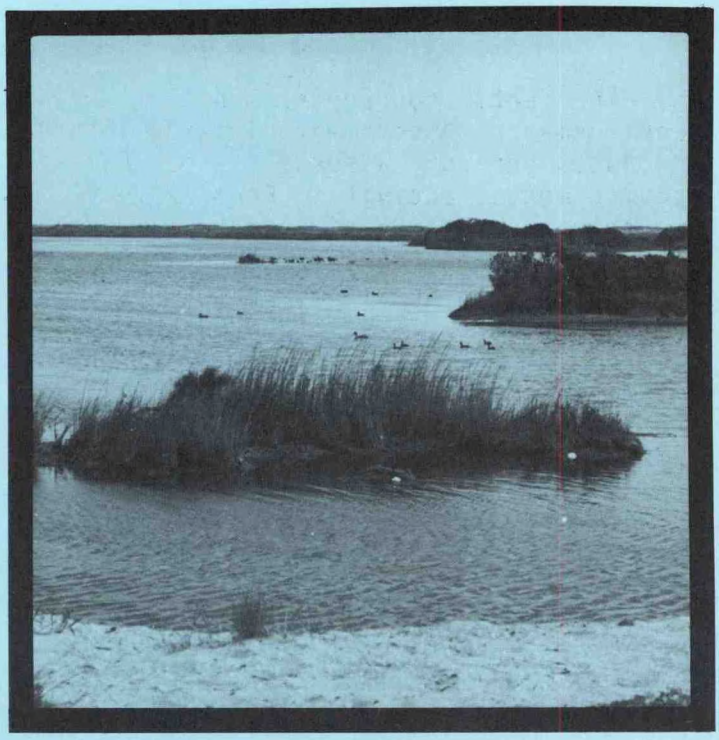
Marine Environmental Assessment

CHESAPEAKE BAY

JUNE-AUGUST 1982



U.S. DEPARTMENT OF COMMERCE
National Oceanic and Atmospheric Administration
Environmental Data and Information Service
Center for Environmental Assessment Services

CLIMATE IMPACT ASSESSMENT
UNITED STATES

The Center for Environmental Assessment Services (CEAS), Marine Environmental Assessment Division (MEAD), Marine Assessment Branch (MAB), produces periodic assessments of weather impacts on economic sectors of marine environmental activity. From September 1981 through March 1982, MAB issued monthly assessments of Chesapeake Bay in the economic sectors of fisheries, recreation, and transportation. The Chesapeake Bay region served as a prototype for assessment development. We now issue quarterly assessments in order to extend the service to other marine areas within existing resource limitations.

Please send any comments or questions regarding CEAS marine assessments to the Branch Chief, NOAA/EDIS/CEAS, Marine Environmental Assessment Division, 3300 Whitehaven Street, NW, Washington, DC 20235, or call (202) 634-7379.

Front Cover Photographs

Wave Damaged Coastline - Star News Photo by J. Nesbitt
Beach Scene - EPA Documerica - Hope Alexander
Salt Marsh - NOAA File Photo
Catch on Fishing Boat - NOAA Photo by M. Dowgiallo

October 1982

CHESAPEAKE BAY MARINE ASSESSMENT

At present CEAS limits assessment coverage in the marine environment to Chesapeake Bay. The marine ecosystem exhibits many complex interrelationships which are difficult to measure. Climatic events do not often produce an obvious immediate response in the marine environment. The extended intervals that frequently exist between a climate event and the observed impact present a problem different from the land oriented assessments CEAS has previously produced. This difference necessitates relating changes in climatic variables to marine environmental changes on a quarterly basis. For Chesapeake Bay, June through August covers the warm, relatively stable summer months; September through November covers the dynamic fall period of decreasing temperatures and water column turnover and vertical mixing; December through February covers the cold winter period; and March through May covers the dynamic spring period of increasing temperatures and nutrient enrichment.

The CEAS effort in Chesapeake Bay is a first step toward providing operational marine assessments for major water bodies within and adjacent to the United States.

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Chesapeake Bay Marine Environment

Quarterly Assessment
June - August 1982

1. Highlights - General Events and Impacts

Commercial fish harvesting, recreation and transportation activities proceeded normally during the quarter.

Persistent rainfall in early June interrupted normal harvest activities for blue crabs in Virginia although crabs later remained in good supply throughout the summer months.

Jellyfish (stinging nettle) infestation of of Bay waters reached the highest level in 12 years.

Table 1 summarizes impacts of climate events by economic sector.

Table 1. Climate impact summary, Chesapeake Bay, June - August, 1982.

CLIMATE EVENT	FISHERIES							RECREATION					TRANSPORTATION					
	Oysters	Crabs	Hard clams	Finfish	Diseases	Noxious animals		Boating	Park usage	Safety			Port operations	Vessel traffic				
Low incidence tropical storms								+	+	+			+	+				
Cool water temperatures																		
High June precipitation		-						-	-	-								
Near normal salinity																		
Cool air temperatures																		
Light wind activity								+	+	+								

LEGEND:

+ Favorable

- Unfavorable

☐ No abnormal effect, data unavailable, or not applicable

2. Weather Summary

June 1982:

June was marked by above normal precipitation and below normal temperatures (Table 2). Figure 1 shows selected meteorological stations around Chesapeake Bay.

A cold front sweeping southward on the 2nd brought heavy precipitation to Wilkes-Barre and lesser amounts to other Bay area stations. A low pressure system developed on this front over Cape Hatteras and continued precipitation at stations northeast of the Bay. The most extensive precipitation for the month came from a frontal low which developed over the Bay on the 12th and 13th. A cold front on the 16th increased precipitation totals at stations in Pennsylvania. A low of tropical origin on the 18th and 19th and a cold front on the 28th and 29th added to precipitation levels. Stations in Pennsylvania received more abundant rainfall than stations in Maryland, up to six inches above normal. Richmond and Norfolk were only slightly above normal.

Temperatures were cooler than normal throughout the region, ranging from 0.3°F below normal at Chantilly, VA to 6.6°F below normal at Harrisburg. Temperatures did reach into the low 90's toward the end of the month.

Cold fronts and accompanying thunderstorms brought 30 mph winds to the Bay on the 4th, 16th and 29th. Wind gusts registered 49 mph on the 16th at Baltimore.

July 1982:

July temperatures remained near average over the area though stations in Pennsylvania remained slightly cooler than normal (Table 2). Precipitation was below normal for the majority of stations, contrasting noticeably with June levels.

Except for excesses of precipitation at Richmond and Royal Oak and the small excess at Norfolk, July precipitation was below normal in the Chesapeake Bay area. The James River and Potomac River watersheds in Virginia and West Virginia fared better from frontal showers. Though no major storms occurred during the month, cold fronts passed over the Bay area four times, each time backing off as a warm front and recrossing again, thereby increasing the occurrence of frontal influences threefold. Richmond received 1.6 inches of rain in ten minutes during a thunderstorm on the 12th when a cold front crossed the area. Total precipitation during the storm was 2.7 inches. Royal Oak measured 1.1 inches the morning of the 14th. A cold front the last day of the month brought heavy rain in thundershowers to the middle Bay area. Royal Oak reported 2.4 inches on the 30th. Other stations near Royal Oak received nearly as much rainfall.

Average daily temperatures ranged from 1.2 to 1.8°F cooler than normal among the three Pennsylvania stations (Table 2). The remainder showed slightly above normal temperatures, ranging from 0.3°F above at Norfolk to 2.1°F above at Patuxent. Royal Oak was 0.3°F below normal.

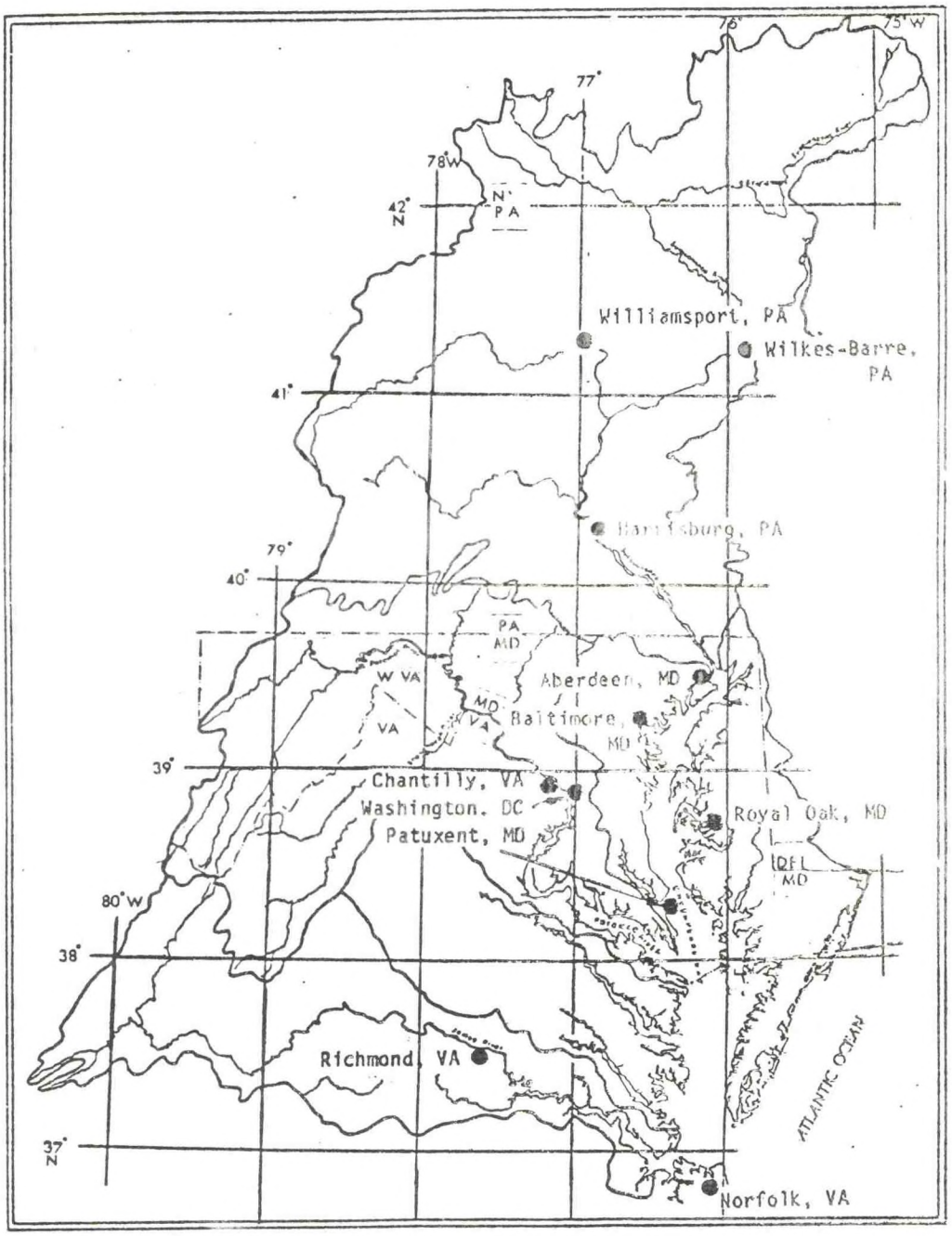


Figure 1. Selected meteorological stations, Chesapeake Bay watershed (Modified EPA map).

Table 2. Precipitation/temperature totals and anomalies, Chesapeake Bay watershed, June-August 1982

Station	Total Precipitation and Departure from Normal Observed/*Anomaly (Inches)			Air Temperature and Departure from Normal Observed/*Anomaly (Deg.F)		
	June	July	August	June	July	August
Williamsport, PA	9.23/+5.98	1.81/-2.38	1.00/-2.44	64.5/-4.3	71.1/-1.8	66.6/-4.3
Wilkes-Barre, Scranton, PA	7.22/+3.82	3.32/-0.77	3.42/+0.21	64.3/-3.6	71.0/-1.2	66.2/-3.8
Harrisburg, PA	8.12/+5.01	2.90/-0.80	2.47/-0.75	65.4/-6.6	74.4/-1.7	70.4/-3.5
Aberdeen, MD	4.89/+1.34	1.66/-2.56	2.34/-1.57	69.8/-2.7	76.8/+0.4	72.6/-2.2
Baltimore, MD	5.70/+1.93	2.16/-1.91	0.95/-3.26	69.4/-3.0	77.1/+0.5	73.0/-1.9
Washington, DC	5.41/+1.93	2.98/-1.14	2.68/-1.99	72.8/-1.8	80.3/+1.6	75.3/-1.8
Chantilly, VA	5.49/+1.88	2.11/-2.01	3.36/-0.89	70.8/-0.3	77.0/+1.7	72.3/-1.3
Royal Oak, MD	4.30/+0.53	6.32/+1.64	2.33/-2.55	71.6/-2.2	77.7/-0.3	73.4/-2.3
Patuxent, MD	6.06/+2.58	4.01/-0.14	2.95/-1.40	71.8/-1.2	79.8/+2.1	75.1/-1.2
Richmond, VA	3.97/+0.45	9.21/+3.58	4.39/-0.67	73.4/-0.8	78.6/+0.7	75.0/-1.3
Norfolk, VA	4.22/+0.60	5.83/+0.13	6.50/+0.58	73.4/-1.1	78.6/+0.3	75.3/-1.6
Average	5.87/+2.37	3.85/-0.58	2.94/-1.34	69.7/-2.5	76.6/+0.2	72.3/-2.3

*Anomaly = departure from 30-year average total precipitation for each month

Wind gusts registered 37 mph from the northwest at Patuxent during the frontal passage on the 19th and 50 mph from the northwest at Royal Oak on the 28th during a thundershower.

The decline in streamflow into Chesapeake Bay (Figure 2) during July reflects the large change in precipitation from June. The June-August quarter ended with excess cumulative streamflow near one trillion gallons (Figure 3).

Bay surface salinities were slighty below normal during July, possibly reflecting the influence of heavy precipitation in June (Table 3 and Figure 4). Water temperatures are near normal. Water temperature departures from normal closely match departure from normal values for air temperature (Tables 2 and 3).

August 1982:

Less than normal precipitation and cooler than normal temperatures characterized August. Cool air behind a front August 29 dropped temperatures to new lows for the month at many area stations.

Low precipitation continued throughout August (Table 2). Streamflow began a return toward deficit amounts (Figure 2). The most pronounced precipitation deficit appears at the Baltimore-Washington International airport (BWI) which experienced the 2nd driest August since records began in 1948.

Table 2 shows August temperatures ranged 3.8°F to 1.2°F below normal over the Bay drainage area. On the morning of Sunday the 29th stations throughout the region showed record low temperatures. Norfolk recorded a new low for August the following morning. At Royal Oak the 46°F temperature is the lowest for August since records began in 1892.

Special marine advisories were issued because of thunderstorm activity associated with cold fronts on the 17th and 21st in the upper part of the Bay and the tidal Potomac. Small craft advisories for the entire Bay (areas 1-5) were issued for the 25th and 29th in connection with cold front passages.

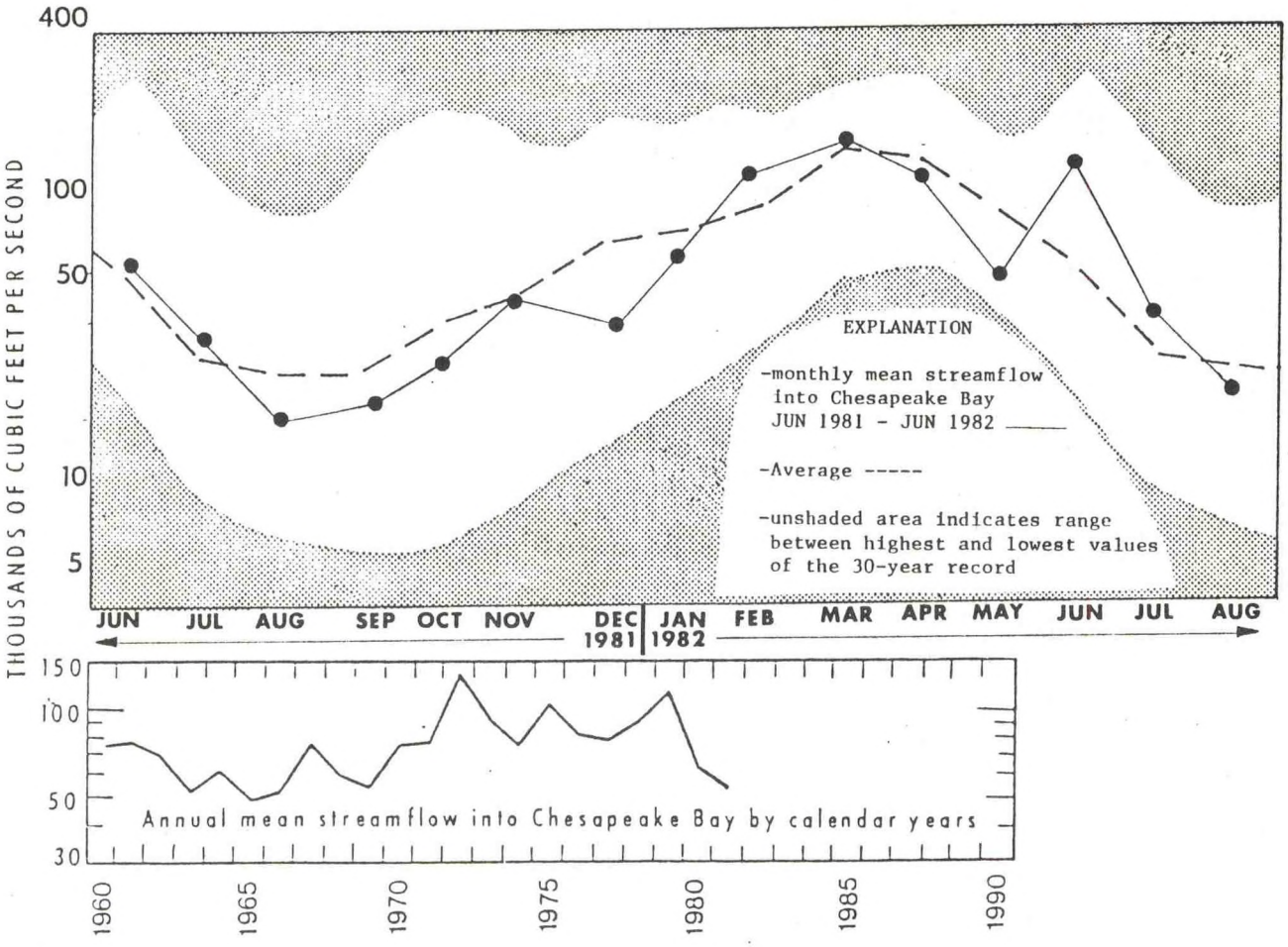


Figure 2. Streamflow into Chesapeake Bay.

Streamflow into Chesapeake Bay was above normal in June and July, and below normal in August, 1982. This reflects greater than expected precipitation in June and July due to higher frequencies of frontal storm activity in the Bay region. The below normal flow in August indicates a lack of tropical storms affecting the Bay region. Data from U. S. Geological Survey.

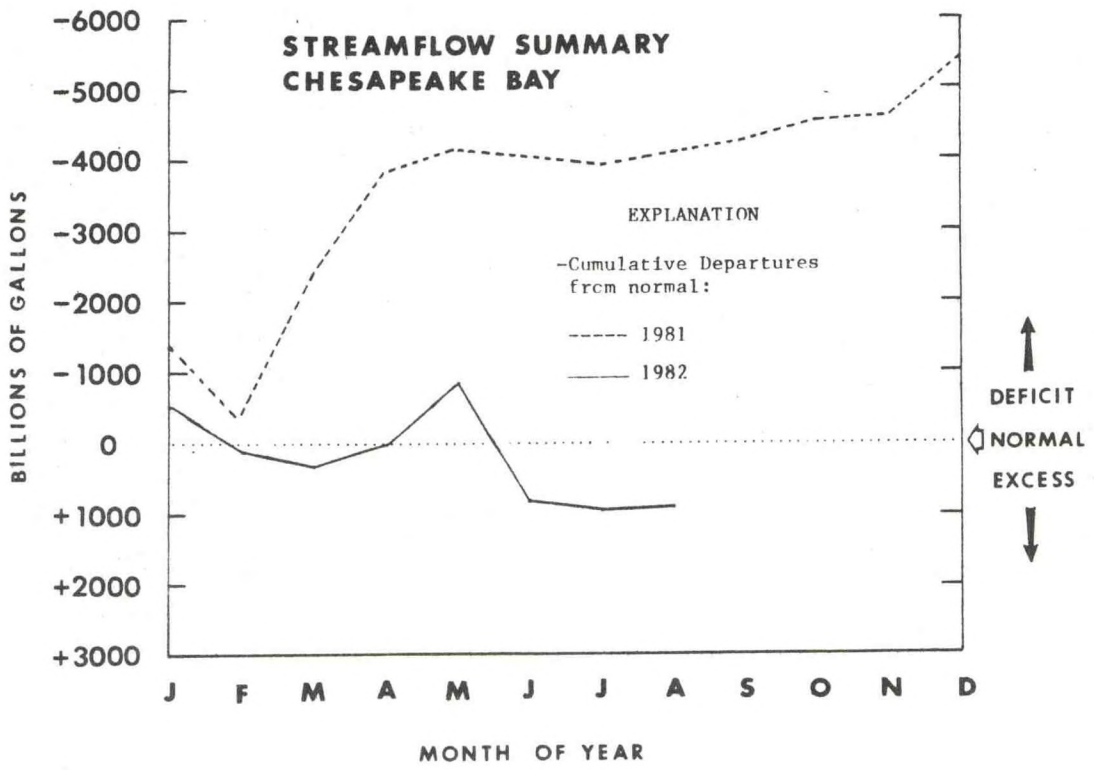


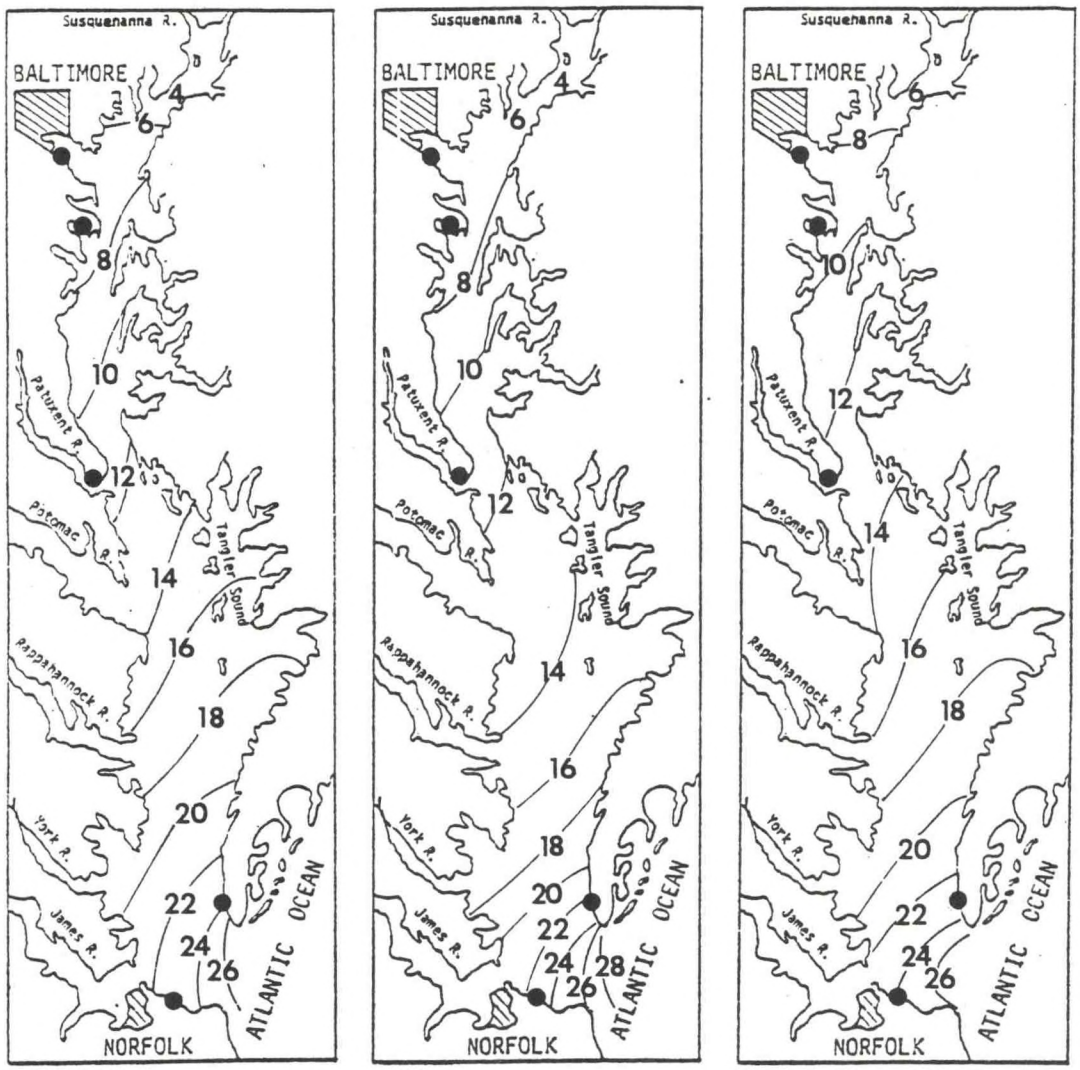
Figure 3. Cumulative streamflow (billions of gallons), Chesapeake Bay tributaries, 1981 and 1982.

After streamflow deficits in spring 1982 (April and May), excess precipitation in Chesapeake Bay in June and July is evident. August streamflow was slightly below normal, but cumulative streamflow for 1982 is above normal and considerably greater than cumulative flow in August, 1981. Cumulative streamflow is above normal in summer 1982 from below normal spring and above normal early summer streamflow. Excess cumulative streamflow in August also suggests that the spring deficit was surpassed by the early summer excess of precipitation. Data from U. S. Geological Survey.

Table 3. Bay surface salinities/water temperatures and anomalies* selected stations, June - August 1982

Station	Surface Salinity and Departure from Normal Observed/*Anomaly (ppt)			Surface Water Temperature and Departure from Normal Observed/*Anomaly (Deg. F)		
	June	July	August	June	July	August
Baltimore, MD	6.9/0.9	6.8/-0.1	8.5/0.5	72.9/-1.2	79.7/0.2	78.1/-1.4
Annapolis, MD	7.2/-0.8	7.4/-1.8	9.4/-0.8	72.1/-2.4	79.9/-0.3	78.4/-1.3
Solomons, MD	11.5/0.3	11.4/-1.2	12.9/-0.6	73.3/-1.2	81.4/1.3	80.9/0.8
Washington, DC	0.4/0.0	0.5/0.1	0.4/0.1	72.8/-4.7	82.3/-0.5	80.2/-1.5
Kiptopeake, VA	24.6/-1.2	23.9/-2.5	24.1/-3.2	73.0/0.9	77.5/0.3	77.0/-0.2
Bay Bridge-Tunnel, VA	22.7/0.5	24.2/0.1	24.5/0.4	73.6/-0.5	77.9/-1.1	77.6/-2.3

*Anomaly = departure from long term averages for each month



JUNE **JULY** **AUGUST**

Figure 4. Mean surface salinity distribution, Chesapeake Bay, June - August, 1982.

Isonalines (parts per thousand) are linearly interpolated from designated station data. Salinities throughout the quarter June through August remained near 30 year average values. Data from National Ocean Survey, NOAA.

3. Impact of Climate/Weather on Bay Fisheries, Recreation, and Transportation

Fisheries

Commercial fishing activities in Maryland and Virginia continued uninterrupted by weather during the quarter.

Striped bass production in Chesapeake Bay may be recovering from its 1981 low. Scientists are finding densities of inch-long fry in the Potomac and Rappahannock rivers 100 to 1000 times greater than last year.

Stinging nettles infested Bay waters at the highest level in 12 years.

High June streamflow lowered Bay salinities considerably from May levels (Table 3). High levels of suspended material, an impact of freshwater runoff, were reported from June sampling in Maryland waters.

Persistent wind and rain in early June made it difficult for crabbers to work in Virginia, contributing to inconsistent catches and inflated market conditions.

Rainfall in early June delayed recreational fishing activities for up to two weeks. Strong runoff in upper creeks and tributaries created turbid and swift running water conditions which slowed fishing activities.

Recreation

Favorable weather conditions prevailed during the summer quarter throughout the Bay region. The low incidence of tropical storm activity allowed uninterrupted usage of recreational facilities and boating. Small craft advisories were in effect only four days in the quarter (Table 4 and Figure 5). Although severe thunderstorms occurred 14 times and one tornado report was issued, no major storm activity disrupted Bay recreation. Maryland Department of National Resources Marine Police report 91 boating accidents, 58 injuries, 13 deaths and $219,357 property damage for recreational boating, excluding the accident total and property damage for August (Table 5). The U.S. Coast Guard conducted 1301 Search and Rescue (SAR) operations during the quarter (Table 6).

Table 7 shows attendance and revenue statistics for four major State-run recreational facilities on Chesapeake Bay in Maryland and Virginia.

Transportation

Shipping and related shore activities at Maryland and Virginia ports proceeded normally during the quarter.

Table 4. Marine advisories/warnings, Chesapeake Bay, June - August 1982 (National Weather Service data)

Date		Condition Report[1]	Location
June	1	D (Tornado)	Lower Bay (near Ocean View)
		D (Thunderstorm)	Tidal Potomac River
	14	D (Thunderstorm)	Tidal Potomac River
	16	D (Thunderstorm)	Bay, south of New Point Comfort
	17	D (Thunderstorm)	Hampton Roads and adjacent waters
	18	A	Bay, south of Windmill Point[2]
	19	A	Bay, south of Windmill Point
	22	D (Thunderstorm)	Tidal Potomac River
	29	D (Thunderstorm)	Tidal Potomac River
July	3	D (Thunderstorm)	Tidal Potomac River, north of Colonial Beach
	3	D (Thunderstorm)	Bay, south of York River
	3	D (Thunderstorm)	Bay, south of Patuxent River
	13	D (Thunderstorm)	Bay, south of Windmill Point
	19	D (Thunderstorm)	Bay, north of Patuxent River
	19	D (Thunderstorm)	Bay, south of Patuxent River
	23	D (Thunderstorm)	Bay, entire Virginia portion
August	17	D (Thunderstorm)	Tidal Potomac River
	21	D (Thunderstorm)	Baltimore Harbor and northward
		D (Thunderstorm)	Tidal Potomac River
	25	A	Tidal Potomac River and entire Bay
	29	A	Tidal Potomac River and entire Bay

(1)Key to Condition Reports:

A = Small Craft Advisory (Wind 25-34 knots)
B = Gale Warning (Wind 34-47 knots)
C = Storm (Wind 47-64 knots)
D = Special Marine Warning (Unusual weather phenomena)

(2)Windmill Point = North side of Rappahannock River

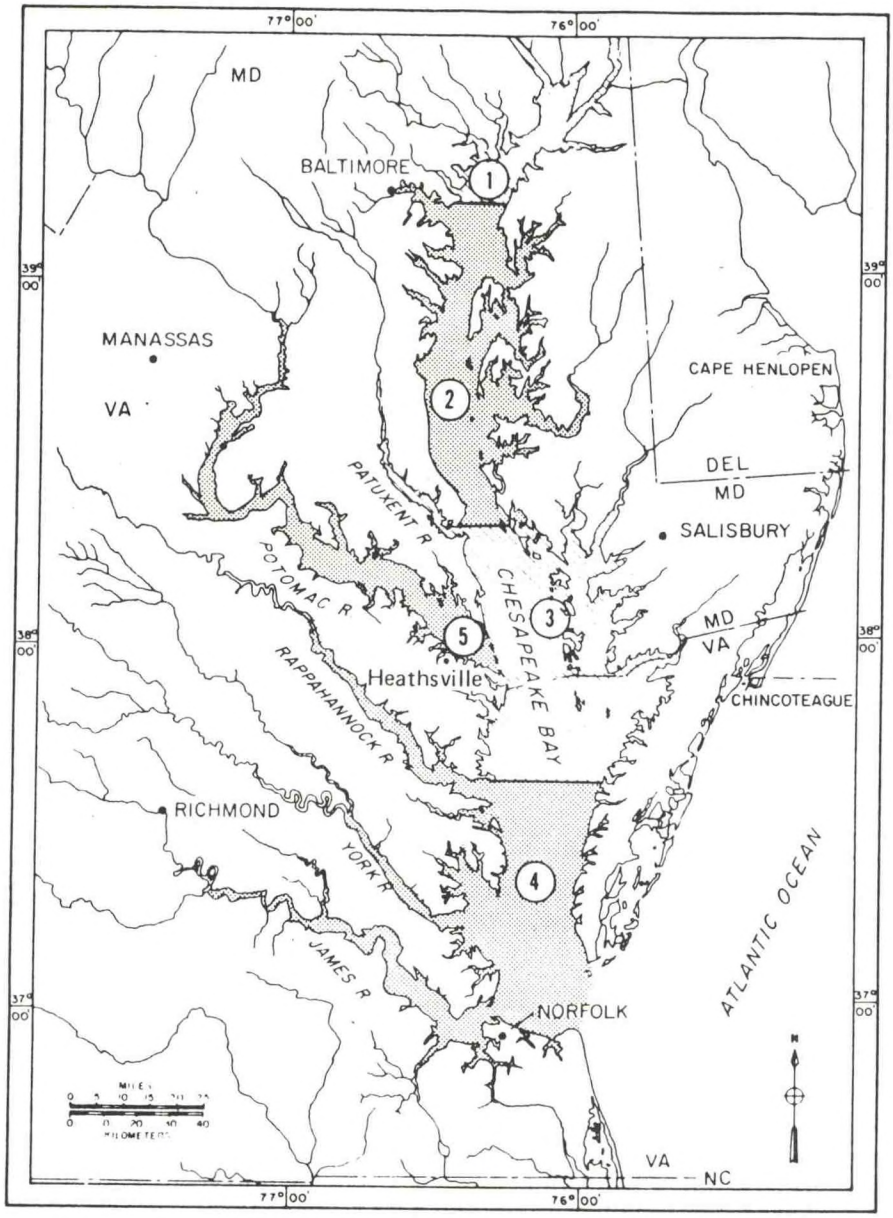


Figure 5. National Weather Service (NWS) forecast areas for Chesapeake Bay.

Table 5. Maryland marine accident statistics for the quarter, June - August 1982

Month	No. of Boating Accidents	No. of Injuries	No. of Deaths	Property Damage
June	38	12	2	$156,505
July	53	27	4	62,852
August	N/A	19	7	N/A
TOTALS	91	58	13	$219,357

Data Source: Maryland Department of Natural Resources Marine Police. All categories are for recreational boating. Includes Potomac River to Virginia shoreline. August statistics are preliminary and subject to revision.

Table 6. U.S. Coast Guard Search and Rescue (SAR) caseload, June - August 1982

	Number of Search and Rescues		
Month	Group Baltimore	Group Eastern Shore	Group Norfolk
June	162	19	182
July	229	31	262
August	210	30	176
TOTALS	601	80	620

Group Baltimore - most of Upper Bay.
Group Eastern Shore - lower central portion of Eastern Shore
Group Norfolk - most of Lower Bay

Table 7. State parks attendance and revenue, selected Maryland and Virginia facilities

	Maryland State Parks				Virginia State Parks			
	Sandy Point		Point Lookout		Seashore		Chip Oaks Plantation	
Month	Usage	Revenue	Usage	Revenue	Usage	Revenue	Usage	Revenue
June	60,806	$59,204	19,928	$30,481	70,019	$20,220	4,193	$ 290
July	94,832	$68,100	31,737	$23,507	95,653	$19,901	76,615	$3,999
August	67,431	$ N/A	47,457	$ N/A	65,868	$14,824	5,467	$ 246
TOTALS	223,431	$ N/A	99,122	$ N/A	231,540	$54,945	86,275	$4,535

Data Source: Maryland Department of Natural Resources, Parks and Recreation, and Virginia Department of Parks and Recreation.