Chesapeake Bay is the Nation’s largest and most productive estuary. Located entirely within the borders of Maryland and Virginia, it is some 180 miles long, and has a mean width of 15 miles. The bay has depths up to 175 feet, but the average depth of the entire estuarine system—including tributaries—is about 21 feet.

The bay proper has a surface area of around 2,500 square miles, but the total estuarine system is about 4,400 square miles. The Chesapeake’s greatly indented shoreline totals 8,100 miles, 4,000 miles in Maryland and 4,100 in Virginia.

Major sources of freshwater to the Chesapeake come from two large interstate rivers—the Susquehanna and the Potomac. They have a combined average flow of about 58,000 cubic feet per second. This flow varies, reaching a peak in late winter and spring, with low flows in late summer and fall.

The immense biological value of the Chesapeake Bay resulting from the complex interactions inherent in its makeup is summarized by Eugene Cronin in the foreword of Alice Lippson’s *Chesapeake Bay in Maryland—An Atlas of Natural Resources* (1973):

“The result is a biological treasure. The nutrients make it possible for plankton and rooted aquatic plants to produce enormous quantities of organic material. These feed the world’s largest crops of oysters and clams in water salty enough for them but
not salty enough for their worst natural predators.

"The estuarine waters of Maryland also support large populations of many species of fish, and the vital low-salinity region, where salt content is between 0 and 10 parts of salt per 1,000 parts of water, is the required habitat for an almost invisible resource, the eggs and larvae of rock, shad, herring, and many other species which spawn in the rivers, bay, and ocean.

"This is the most important spawning and nursery area in the world for the rock or striped bass, and it is of extraordinary importance for other species ..."

**EPA Study Made**

The importance of Chesapeake Bay is borne out by the fact that in 1976 Congress directed the Environmental Protection Agency to conduct a $25 million study of the environmental quality and management of the bay's resources. A major objective of this study, known as the Chesapeake Bay Program, was to coordinate research to assess the principal factors adversely impacting the bay's water quality. Three major areas received extensive attention in the study: Nutrient enrichment, toxic chemicals, and submerged aquatic vegetation. Results of this effort are presently being published.

Among vital components of the bay's ecology are its coastal wetlands. These areas, subject to regular or periodic tidal action, support aquatic growth, which is a principal source of food and cover for many animal species that inhabit the Chesapeake Bay estuary, its tidal tributaries, and the nearshore ocean. Waterfowl, songbirds, mammals, fish and shellfish depend to varying degrees on the coastal wetlands during a portion of their life cycle.
Although many details of the production, distribution, and consumption of the wetland food supply are not known, available information reveals that an abundance of food is produced. Some is harvested directly by animals and a large amount becomes available in the form of detritus, a pulverized form resulting from decay of dead plant tissues. This decomposition also returns important nutrients to the water system.

Many of the animal species that depend upon the coastal wetlands during a portion of their life cycle—such as fish, shellfish, and furbearing animals—are of direct commercial value. Others are of recreational value to fishermen, hunters, and observers of nature.

**Water Quality Role**

The coastal wetlands also provide several functions important to water quality. They serve as settling or filtering basins—collecting sediment, overland runoff, and attendant pollutants. Their absorption and storage capabilities can temporarily retain water from overland runoff and tidal inundation, and then gradually release it to the estuarine system.

Coastal wetlands not subject to direct ocean exposure also provide erosion control benefits. Shoal waters, immediately channelward of the vegetated wetlands, are shallow and tend to reduce wave energy before it reaches the wetland. The low profile of the wetland vegetation then in turn dissipates the remaining wave energy over its surface. By absorbing the energy of waves, wetland vegetation reduces velocity of the water flow.

Both Maryland and Virginia are well endowed with coastal wetlands, most of which are located on the Eastern Shore of Chesapeake Bay. There are an estimated 280,000 acres of vegetated tidal wetlands in Virginia. In Maryland, the vegetated tidal wetland resource, including submerged aquatic vegetation, is about 250,000 acres. Thus, the total for the Chesapeake Bay region, including coastal bays on the Atlantic shoreline, is about 530,000 acres.

Vegetated coastal wetlands of the bay can generally be divided into four categories: Shrub swamp, swamp forest, herbaceous marsh, and submerged plants. Herbaceous marshes generally are discussed in terms of fresh, brackish, or saline marsh. Thus, the vegetated coastal wetlands can be divided into these general types: Shrub swamps, swamp forests, fresh marshes, brackish marshes, saline marshes, and submerged aquatic vegetation.

**Maryland Categories**

The Maryland wetlands classification system distinguishes 35 wetland types, 32 vegetated and 3 unvegetated types. Besides the 4 vegetative forms mentioned above, also recognized are categories of unvegetated wetlands (open water, mudflats, and beaches/sandbars), three ranges
of salinity within the marshes (fresh, brackish, and saline), and two tidal ranges within the brackish and saline marshes (low, or regularly flooded, and high, or less frequently flooded).

The wetland types discussed are based on a report prepared for the Maryland Department of Natural Resources by McCormick and Somes, *The Coastal Wetlands of Maryland* (1982). Types described apply to the entire Chesapeake Bay system, Maryland and Virginia. Unless otherwise indicated, acreage figures apply only to the Maryland portion of Chesapeake Bay.

The most extensive wetland types of the Chesapeake Bay are the brackish marshes. This is because the various wetland types form a continuum; that is, they tend to merge gradually from one extreme to the other extreme.

At one extreme are the freshwater wetlands near the head of the tide. These wetlands are never exposed to salt concentrations of more than 0.5 parts per thousand (ppt). At the other end of the spectrum are the saline wetlands that are regularly flooded by waters of the Atlantic Ocean, which contain salt at concentrations of 35 ppt or more.

The brackish wetlands occupy a large portion of the area between these two extremes. Because the basic variable feature within the wetland spectrum is salinity, environmental limits of the fresh, brackish, and saline wetlands must by definition be somewhat arbitrary.

**General Types**

Following is a brief description of the general types of vegetated coastal wetlands of Chesapeake Bay.

**Shrub Swamps.** Ranging in size from less than one acre to a hundred acres or more, shrub swamps occur in the form of linear thickets along upland margins of fresh and brackish marshes, and as relatively extensive swamps at headwater areas of many tidewater streams.
Swamp Forests. There are three principal types of swamp forests in the Chesapeake Bay region. They occur most commonly at headwater areas of tidewater streams or peripheral to fresh tidal marshes. The most extensive is the red maple/ash swamp forest. Major trees in the broadleaf red maple/ash swamp forest type are red maple, green ash, blackgum, and sweetbay.

In Maryland, baldcypress swamp forests occur mainly in two lower Eastern Shore counties. The baldcypress is a winter-bare, needleleaf tree. Although it forms small, nearly pure stands in some areas, the baldcypress grows more commonly in narrow fringes along the margins of tidewater streams. Baldcypress occurs as a dominant also in some Virginia tidal swamps, a good example being along the Chickahominy River.

Loblolly pine swamp forests commonly occupy sites adjacent to brackish marshes, and frequently the undergrowth of these pine forests is a continuation of brackish marsh vegetation. Although stands of loblolly pine may be quite dense, frequently it occurs in stands that are open and savannalike, with widely spaced trees.

Fresh Marshes. An interesting feature of the coastal wetlands is that the number of species of plants increases as the salinity of adjacent waters decreases. Thus, freshwater marshes generally have the greatest diversity in terms of the
number of plant species. Brackish marshes are of intermediate diversity, and saline wetlands exhibit the least diversity. Vegetation in a freshwater marsh also tends to be randomly distributed, whereas vegetation in brackish and saline marshes tends to occur in a more regular sequence from the shore to upland edges of the wetlands.

Vegetative stands in the freshwater marshes may consist of tall grasslike plants such as wildrice, big cordgrass, common reed, threesquares, bulrushes, cattails, and sweetflag; masses of broad-leaved plants such as spatterdock, arrowarum, bur-reeds, pickerelweeds, arrowheads, and white waterlily; or stands of tall, single-stemmed herbaceous plants such as bur-marigolds, waterhemp, and spotted touch-me-not. Other components include herbaceous...
thickets consisting of smartweeds, tearthumbs, burmaringolds; low stands of tangled grasses such as rice cutgrass; and shrublike thickets containing rosemallow and water willow.

Fresh tidal wetlands occur most extensively along upper portions of the bay’s tributaries, such as the Patuxent, Nanticoke, Wicomico and Choptank Rivers in Maryland and the Mattaponi, Pamunkey, James and Rappahannock Rivers in Virginia.

**Brackish Marshes.** The brackish marshes can be divided into two classes, low marshes and high marshes. The main difference, as indicated, is in their relative elevation, but they also differ in types of vegetation they support. The low marshes, characterized by stands of smooth cordgrass, are partly or wholly inundated during periods of high tide.

Brackish marshes are the most extensive wetlands along Chesapeake Bay, covering 151,648 acres in Maryland alone, or 58 percent of that State’s coastal wetland resource. The most extensive marshes are along the middle and lower Eastern Shore of the bay.

Brackish high marshes are much more extensive than brackish low marshes. High marshes often are characterized by extensive stands of needle-rush and meadow cordgrass/spikegrass, which also are the most abundant coastal wetland types in Maryland. Both vegetation types are represented by homogeneous, and sometimes extensive, stands of vegetation. Smooth cordgrass, which also tends to occur in homogeneous stands, is the only type of brackish low marsh.

**Saline Marshes.** The saline coastal wetlands are not located on the shores of Chesapeake Bay, but exist in the seaside bay areas of Maryland and Virginia. The seaside bays along the Atlantic shoreline of Maryland and Virginia—Assawoman Bay, Sinepuxent Bay, Chincoteague Bay, Hog Island Bay, Cobb Bay, and South Bay—contain vast salt-marshes, particularly in the Hog Island, Cobb Bay, and South Bay areas of Virginia. These areas contain the most extensive tidal wetland systems in Virginia.

Like brackish marshes, saline marshes contain low and high marsh sites. In contrast to brackish marshes, however, a higher percentage of the total saline marsh occurs as low marsh.

Smooth cordgrass in the saline low marshes occurs in tall growth and short growth forms. The tall growth form, reaching 2 to 4 feet or more, grows along margins of bays and tidal channels. The short growth form, generally not exceeding a foot in height, grows farther back on the marsh surface.

As noted earlier, saline marshes exhibit the least diversity compared to fresh and brackish marshes. There are three predominant vegetation types in the saline high marshes.
The short-growth form of smooth cordgrass surrounds a shallow salt pond in a saline low marsh. Saline coastal wetlands are in the seaside bay areas of Maryland and Virginia.

Meadow cordgrass/spikegrass is most abundant. Two shrubby plants, marshelder and groundselbush, make up the second type. These shrubs occur in highest portions of the marsh, generally near the upland edges but also on higher ground scattered through the marsh. Although extensive in brackish high marshes, needlerush, the third saline high marsh type, is less abundant in the saline marshes.

**Submerged Aquatic Vegetation.** Made up of at least 24 species of flowering plants and 7 kinds of macroscopic algae, submerged aquatic vegetation occurs in shallow waters of Chesapeake Bay and its tidal tributaries and marsh ponds. It is also found in the seaside bays along the Atlantic shoreline. Stands of these plants may be small or extensive, and they are subject to vast fluctuations in their populations. Areas covered by luxurious stands of submerged plants in one year may be nearly barren the next. The stands may or may not redevelop in subsequent years.

The sensitive nature of submerged aquatic vegetation
makes it difficult to estimate the extent of this wetland type at any given time.

Although during the last several decades there has been a general decline in submerged vegetation in the bay, the decline has been dramatic since 1970. Because of its importance to the bay system, the decline of submerged vegetation was included as a critical research area in the Chesapeake Bay Program mentioned earlier.

While specific reasons for the decline in submerged vegetation may vary from area to area, the bay program study results indicate that a general increase in nutrients to the bay system may be a major factor contributing to the decline. Nutrients are needed for survival of submerged vegetation; however, excessive nutrient enrichment can cause algal blooms which in turn block out light available to the submerged grasses.

Nature also has her means of affecting populations of submerged plants. Prolonged droughts allow brackish water to encroach farther upstream than normal and can destroy submerged plants restricted to freshwater areas. On the other hand, rapid increases in freshwater to the bay also can have an adverse effect. This was evidenced in the early 1970's when tropical storm Agnes passed through the Chesapeake region and produced an abrupt halt to what had been a general trend toward recovery of submerged plants in many bay areas.

**Managing Bay Wetlands**

Importance of coastal wetlands to the Chesapeake Bay ecosystem cannot be overestimated. Public awareness of the value of these tidal areas led to passage of legislation in both Maryland (1970) and Virginia (1972). Intent of the Maryland and Virginia Wetlands Acts is to conserve the coastal wetlands and ensure the wisest use of these valuable areas. Both States have established a public policy of preserving coastal wetlands and preventing their despoliation and destruction.

Before passage of the Maryland Wetlands Act, it is estimated that wetland losses in Maryland exceeded 23,000 acres for the period 1942–1967. For the 60-year period prior to 1967, however, wetland destruction may have approached 200,000 acres. This is based on a 500,000-acre total reported to exist in Maryland in 1908. In Virginia, before passage of that State's Wetlands Act, it was predicted that wetland loss would approximate 400 acres per year during the 1970's.

The Maryland Wetlands Act established a permit and licensing program administered at the State level. Any proposal to dredge or fill tidal wetlands requires a private wetlands permit (if the project is landward of the mean high water shoreline) or a State wetlands license (if the project is located channelward of the mean high water shoreline). In Virginia, a permit is also required for any activity that may affect its tidal wetlands. In that
State, this permit review process is handled by local review boards with State oversight.

**Losses Curtained**

Both State programs have been effective in curtailing wetland losses. During the first four years of its program, wetland losses in Virginia were reduced to less than 20 acres per year. Wetland losses have been reduced to the same amount in Maryland since inception of its program.

Over the past 10 to 15 years, the values of our coastal wetlands have become well recognized. This has had a significant impact because it presents several challenges to the wetland manager today. One is fostering even greater public awareness, along with education programs.

A second is keeping wetland losses below limiting thresholds, beyond which natural forces cannot compensate for the damage.

Each specific instance of wetland destruction or alteration may not seem significant or important; however, from a regional or statewide perspective, the accumulation of acreage losses becomes more meaningful. In these challenges, natural processes versus man-caused impacts must be dealt with from this overall standpoint, as well as on a project-by-project basis. The true art in wetlands management is balancing the two so that human endeavors, to the extent possible, can be accommodated while at the same time integrity of the natural environment is maintained.

**Further Reading**


Metzgar, Roy G., 1973. *Wetlands in Maryland*. Maryland Department of State Planning. Prepared in cooperation with the Maryland Department of Natural Resources and Department of Economic and Community Development.


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