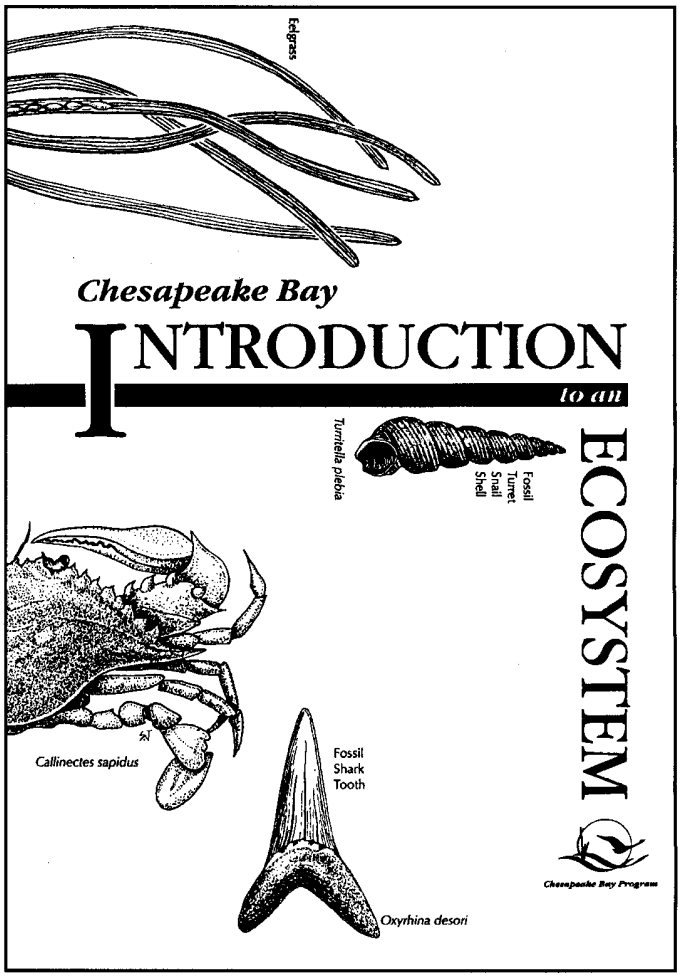
Chapter One:
Chesapeake Bay Ecosystem



Chesapeake Bay Ecosystem

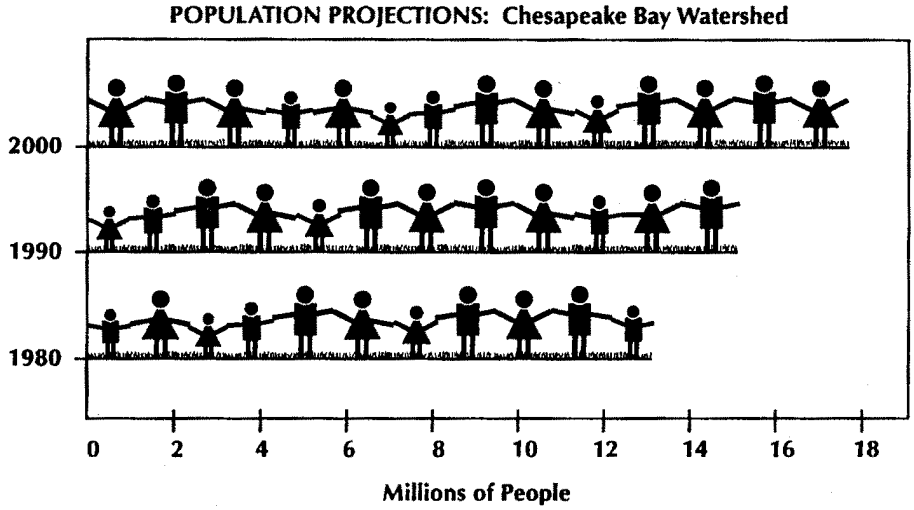
The physical processes that drive the Bay ecosystem sustain the many habitats and organisms found there. Complex relationships exist among the living resources of the Chesapeake Bay watershed. Even the smallest of creatures plays a vital role in the overall health and production of the Bay. Forests and wetlands around the Bay and the entire watershed filter sediments and pollutants while supporting birds, mammals and fish. Small fish and crabs find shelter and food among lush beds of submerged aquatic vegetation. Unnoticed by the naked eye, phytoplankton and microzooplankton drift with the currents, food for copepods and small fish. Clams and oysters pump Bay water through their gills, filtering out both plankton and sediment. During the fall and winter, waterfowl by the thousands descend upon the Bay, feeding in wetlands and shallow waters. Bald eagles and ospreys, perched high above the water, feed on perch, menhaden and other small fish to their young. The spectrum of aquatic environments, from freshwater to seawater, creates a unique ecosystem abundant with life.

> BAY FACT: Everyone in the watershed lives just a few minutes from one of more than 100,000 streams and rivers draining into the Chesapeake Bay.

The relentless encroachment of people threatens the ecological balance of the Chesapeake Bay. Fifteen million people live, work and play in the watershed. Each individual directly affects the Bay by adding waste, consuming resources and by changing the character of the land, water and air that surrounds it. However, through the choices we make in our everyday lives, we can lessen our impact on the Bay's health. We must nurture what Aldo Leopold once termed as our "wild rootage" - a recognition of the fundamental connection and dependency between society and the environment. As advocates for the Bay and its many living resources, we can preserve the Chesapeake for years to come.

• The Watershed

The Chesapeake Bay receives about half its water volume from the Atlantic Ocean. The rest drains into the Bay from an enormous 64,000 square-mile drainage basin or watershed. The watershed includes parts of New York, Pennsylvania, West Virginia, Delaware, Maryland and Virginia and the entire District of Columbia. Freshwater from springs, streams, small creeks and rivers flows downhill mixing with ocean water to form this estuarine system. Soil, air, water, plants and animals, including humans, form a complex web of interdependencies that together make up this Chesapeake ecosystem. The 15 million people living in the Chesapeake watershed play an important role in this ecosystem. The activities and problems occurring throughout the entire watershed significantly impact the functions and relationships of the Bay proper. We must choose whether our role will be destructive or productive.



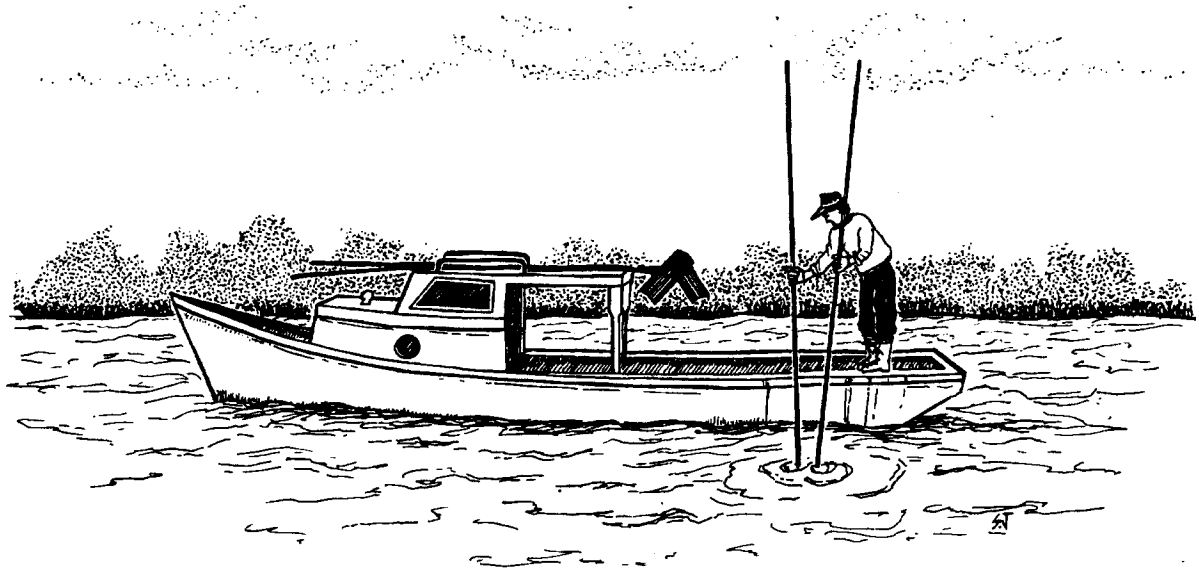
• Chesapeake Bay - An Important Resource

Through the years, residents and visitors alike have found the Chesapeake imposing yet hospitable. The Algonquin Indians called it "Chesepiooc," meaning great shellfish bay. Spanish explorers described Chesapeake Bay as " ... the best and largest port in the world." Captain John Smith, an English explorer, extolled, "The country is not mountainous nor yet low but such pleasant plain hills and fertile valleys...rivers and brooks, all running most pleasantly into a fair Bay." All were impressed with its size, navigability and abundance of wildlife and food.

Today, the Chesapeake is still one of this country's most valuable natural treasures. Even after centuries of intensive use, the Bay remains a highly productive natural resource. It supplies millions of pounds of seafood, functions as a major hub for shipping and commerce, provides natural habitat for wildlife and offers a variety of recreational opportunities for residents and visitors.

Oysters and blue crabs are famous Chesapeake Bay delicacies. From the 1920s to the 1970s, the average annual oyster catch was about 27 million pounds of meat per year. In the last 10 years, the catch has declined dramatically due to overharvesting, disease and loss or degradation of habitat. Chesapeake Bay blue crab production averaged 86 million pounds annually from 1983 to 1992, contributing more than half the nation's catch. Although this figure is consistent with past harvests, fishing pressure, both commercial and recreational, continues to grow. The states of Maryland and Virginia have pledged to jointly manage the Bay's blue crab harvests through pot limits, gear restrictions and license restrictions. More than half the nation's soft-shelled

clams also come from the Chesapeake. An extensive finfish industry, primarily based on menhaden and striped bass, rounds out the Chesapeake's commercial seafood production. In 1992, the dockside value of commercial shellfish and finfish harvests was close to $80 million.



Waterman handtonging for oysters.

The hospitable climate, lush vegetation and natural beauty of the Chesapeake has made it an increasingly popular recreational area. Boating, crabbing, swimming, hunting and camping are major attractions. Both power and sail boating have grown dramatically. In 1993, more than 175,000 pleasure craft were registered.

> BAY FACT: Prior to the late 1800s, oysters were so abundant that some oyster reefs posed navigational hazards to boats.

Sportfishing is another major recreational activity in the Chesapeake. The National Marine Fisheries Service reported that close to 1 million anglers from Maryland and Virginia took almost 600,000 fishing trips in 1991. Recreational fishing in the states of Maryland and Virginia is estimated at more than $1 billion per year.

H. L. Mencken once called the Bay, "...a great outdoor protein factory." A study by the National Marine Fisheries Service ranked the Chesapeake as third in the nation in fishery catch. Only the Atlantic and Pacific oceans exceed the Bay in production. That is an impressive ranking, since the Bay is small compared to these other bodies of water.

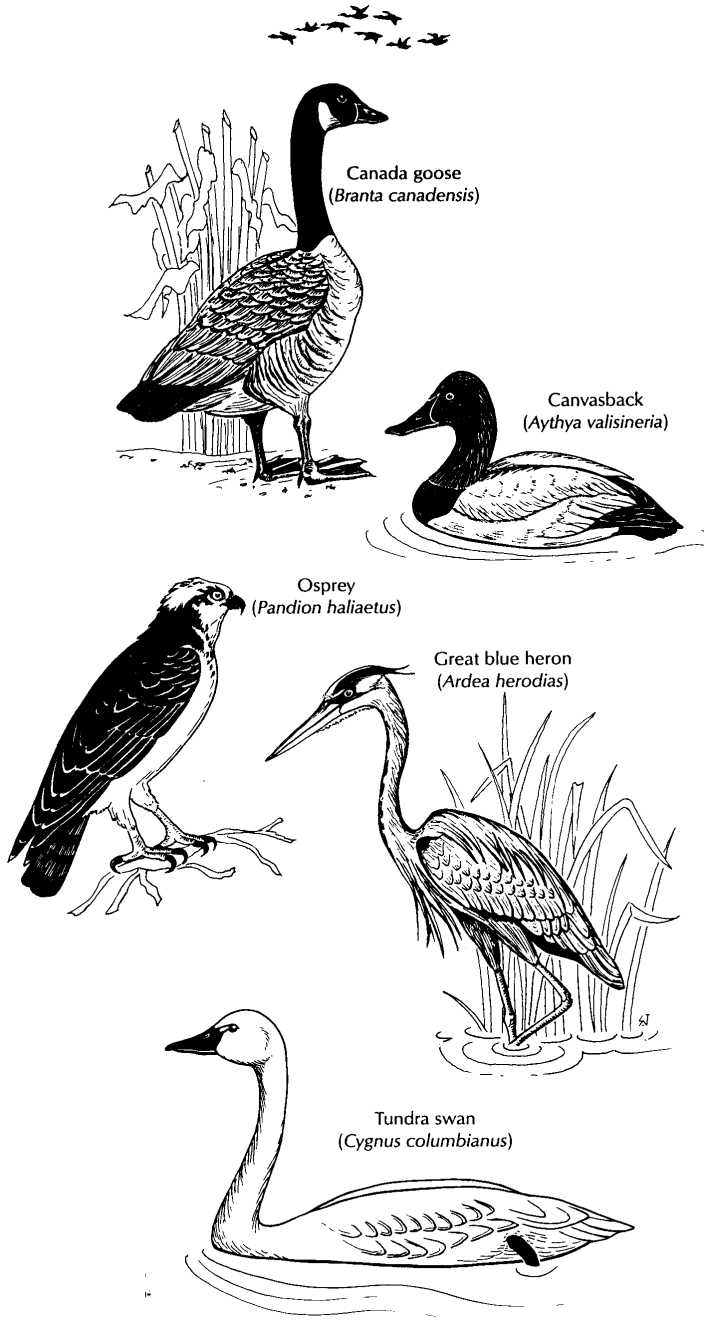
The Chesapeake is also a key commercial waterway, with two of the nation's five major North Atlantic ports located here. The Hampton Roads Complex, which includes Portsmouth, Norfolk, Hampton and Newport News, dominates the mouth of the Bay. Hampton Roads ranks third in tonnage of foreign water-

borne commerce. At the northern end, the Port of Baltimore is ranked ninth in the nation. Baltimore is the leading exporter of trucks and cars in the nation. More than 90 million tons of cargo were shipped via the Chesapeake during 1992. Both Baltimore and Hampton Roads are near the coal-producing regions of Appalachia, making them essential to exporting U. S. coal abroad. The Hampton Roads Complex already leads the nation in exporting coal and lignite.

Shipbuilding and other related industries also depend on the Bay. Industries and power companies use large volumes of water from the Bay for industrial processes and cooling.

Perhaps the Chesapeake's most valuable function, yet most difficult to put a price tag on, is its role as habitat for living resources. The Chesapeake Bay and its surrounding watershed provide homes for a multitude of plants and animals.

Waterfowl and other birds migrating along the Atlantic Flyway stop here, finding food and shelter in the many coves and marshes. The Chesapeake is the winter home for tundra swans, Canada geese and a variety of ducks, including canvasbacks, pintails, scoters, eiders and ruddy ducks. Between 1992 and 1994, an average of 28,000 swans, 300,000 geese and 650,000 ducks wintered on the Bay. It is also a major nesting area for the threatened bald eagle. The nation's largest population of another raptor, the osprey, is in the Bay region.



The Chesapeake's tidal freshwater tributaries provide spawning and nursery sites for several important species of fish, such as white and yellow perch, striped bass, herring and shad. During the warmer months, numerous

marine species, including bluefish, weakfish, croaker, menhaden, flounder and spot, enter the Bay to feed on its rich food supply.

• A Threatened Resource

Chesapeake Bay, the largest estuary in the United States, is part of an extremely productive and complex ecosystem. This ecosystem consists of the Bay, its tributaries and the living resources it supports. Humans, too, are a part of this ecosystem. We are beginning to understand how our activities affect the Bay's ecology. Growing commercial, industrial, recreational and urban activities continue to threaten the Bay and its living resources.

BAY FACT: Nearly half of the nation's catch of blue crabs comes from the Chesapeake Bay.

Overharvesting and loss of habitat threatens fish and shellfish species. These two factors, plus disease, have decimated the oyster population. Excess sediment and nutrients endanger the Bay's water quality. Hypoxia (low dissolved oxygen) and anoxia (absence of dissolved oxygen) are particularly harmful to bottom-dwelling (benthic) species. Toxic substances, particularly high in industrialized urban areas, accumulate in the tissues of birds, fish and shellfish.

To find the causes of and potential remedies for these problems, it is necessary to see the Bay from an ecological perspective. All too often we think of ourselves as external to our environment and ignore the many relationships that link people, other living creatures and the surrounding habitat. If we ignore these connections when seeking solutions to problems, more and greater problems may result.

For example, agricultural activities and residential development increase the amount of sediment and nutrient-rich fertilizers entering the Bay through run-off. Water clarity is reduced and rivers are silted in. Excess nutrients cause algae blooms that block sunlight from reaching critical bay grasses known as submerged aquatic vegetation or SAV. As SAV declines, so does the food, shelter and nursery grounds for many aquatic species. Solutions to these environmental problems can only be effective if complex relationships among all components of the ecosystem are also considered.

When environmental problems are approached from an ecosystem perspective, both living and non-living components are considered when recommending solutions. A truly effective solution not only corrects the problem, but avoids damaging other relationships within the ecosystem. This approach makes problem-solving a great deal more challenging, but leads to more effective environmental management.

BAY FACT: The bay is fairly shallow. A person six feet tall could wade over 700,000 acres of the Bay without becoming completely submerged.