



# Wetlands Report

## Ecotourism And The Chesapeake Bay

Tom Barnard

"Ecotourism" is a term now popping up in both business and environmental circles around the world. It is such a new term, in fact, that it doesn't have a generally accepted definition. It comes to us from the established segment of tourists who are opting for vacations far removed from the "sun and fun/I'm going to Disney World" general resort options. This new vacation phenomenon is a growing business in many Third World countries whose major assets are generally their natural resources including rain forests, mountains and wetlands.

Also going under such names as green tourism, nature tourism and adventure tourism, the industry is affecting the way people look at the natural habitats and other physical and biotic assets which can be exploited to attract "ecodollars." A major difference between ecotourism and the more conventional approach is that the former places a great deal of emphasis on preserving the "natural" environment, because that is what is attracting the vacationer and his/her dollars. The idea is to get as close to nature as possible without damaging the system to any significant extent. Another major tenet of the movement is that it usually involves a learning experience for the visitor.

In Ecuador, for example, an experiment in ecotourism involves the Lower Aguarico River, part of the Amazon rain forest. The travel pack-

age involves five days and four nights, hiking through the jungle, paddling lakes and rivers, seeing many of the 550 species of tropical birds, 10 species of monkeys, piranha, a myriad of butterflies, mosquitoes and all types of critters. The package costs about \$600 plus airfare to Quito, Ecuador. This ecotour program is an experiment according to the company running it, because it

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***The more dollars that are generated due to the resource, the more demand there is to preserve or enhance the factors upon which the resource depends.***

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remains to be seen whether the tours will attract enough visitors to be profitable and whether tourism can be promoted without harming the jungle.

In Belize, Central America, ecotourism has changed the way local farmers raise their produce. The subsistence farmers of the region have, until recently, used the slash and burn method to strip the jungle of vegetation so they may raise their crops. Now the farmers are leaving parts of the forest standing in order to preserve the black howler monkeys which attract ecotourists to the region. This results in an ecodollar

harvest, in addition to their crops. Leaving some of the trees is of obvious benefit to the monkeys whose populations are declining in Latin America in general. Farmers benefit in addition to the ecodollars, because preserving the trees also preserves soil nutrients which were exhausted in five years under the old clearing and farming methodology.

A little closer to home is Dubois, Wyoming. A few years ago community and business leaders predicted Dubois would become a ghost town when the lumber mill, upon which roughly a third of the town's employment base depended, was forced to shut down due to national opposition to logging. Dubois is surrounded by the Shoshone National Forest and is three miles from Whiskey Mountain, a special management area for bighorn sheep.

Rather than becoming a ghost town as predicted, the town is taking advantage of the bighorn sheep and the other natural resources of the national forest to attract tourists. They have a 750 thousand dollar wildlife interpretive center under construction and are capitalizing on other environmental resources. The center will present information on the bighorn sheep and educate visitors on the ethics of animal viewing. The head of the county's economic development programs says that wilderness, wildlife, tourism and recreation have totally replaced the mill.

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Ecotourism  
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The real value of the ecotourism movement is that in bringing dollars into an area, whether primitive and natural or developed to some degree, the ability to maintain and increase the income generated lies in the protection of resources, not in their development, as is the case in most conventional forms of tax base enhancement. In some cases, the relationship between ecodollars and the living resource may not always be as clear as the examples cited above or may be overshadowed by other factors.

In the case of the Chesapeake Bay, for example, approximately 9 million marine recreational fishermen utilize the piers, shores and waters of the estuary annually in pursuit of the many species of sport fish which live in or migrate through Bay waters.

In pursuit of their quarry, these fishermen spend approximately 200 million dollars a year according to Jon Lucy of VIMS' Sea Grant Advisory Program. Thousands more visitors come to the Bay region for any number of other reasons. They may seek to learn about and experience the region's history, they may be hunters or birdwatchers, swimmers or campers, sunbathers or sailors.


All of these vacationers cannot be termed ecotourists except under the broadest of definitions, but each learns from his or her experience in the Bay region and contributes to the local economy. Ecotourists are more active in their travel pursuits, tend to accept the environment as they find it and because they have what may be termed emotional ties to the area visited, tend to join in on efforts to preserve or restore the natural resources diversity. Tourism is certainly not new to the Chesapeake, as it is in some regions of Central and South America, but protection of the Bay resources is no less important. Monitoring and protecting resources such as wetlands, open space, dunes, beaches, fish spawning and nursery grounds, waterfowl nesting areas, as well as other habitats not only sustains these individual areas, but also the overall integrity of the system. Linking all of these elements are the waters of the Bay. Maintenance and improvement of water quality in the Bay is of critical importance to maintaining a healthy ecosystem which can continue to attract ecotourists.

The symbiotic relationship of resource protection and ecotourism in the lower latitudes of the Americas

may not be perfectly paralleled in the Chesapeake Bay experience, but the principle remains the same. Effective resource protection will maintain those attributes of the Chesapeake Bay which make it an attraction for sportsmen and vacationers. In view of the projected population growth within the Bay watershed, the question is "will our existing laws and practices be able to sustain or restore overall Bay integrity."

Many of our current environmental regulatory programs seek to minimize degradation of natural resources while accommodating growth and development. The underlying tenet is that sustaining growth is the reason for regulation; we seek to preserve the environment in order to accommodate more development. The concept of "ecotourism" effectively reverses this priority. Development results from maintenance of the environment, so compromises are more likely to be required of development plans than of environmental protection efforts. An outgrowth of ecotourism therefore is enhancement of the effectiveness of existing environmental regulatory programs because they begin to focus on "positive" goals such as preserving or restoring environmental quality as contrasted with negative goals such as minimizing environmental degradation.

Ecotourism has been practiced to various degrees and with varying levels of success in Chesapeake Bay for a long time. In general the practice received no recognition since it was overshadowed by the more conventional luxury class, "no surprises" approach. As the practice of ecotourism grows around the world and programs achieve success and notoriety, many of the beneficial characteristics of the movement may combine with existing Bay area protection efforts with benefits for all the watershed.



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# Geographic Information Systems

## Mapping Our Coastal Inventory

Marcia Berman

**T**he Comprehensive Coastal Inventory (CCI) Program was established at the Virginia Institute of Marine Science in 1989. The objectives of the program are to maintain an inventory of natural resources existing within the Coastal Plain of Virginia, and to design and initiate research programs which promulgate protocols directed toward responsible environmental management and policy development.

The inventory of resources for the tidal waters of the Commonwealth is developed and administered within the framework of a

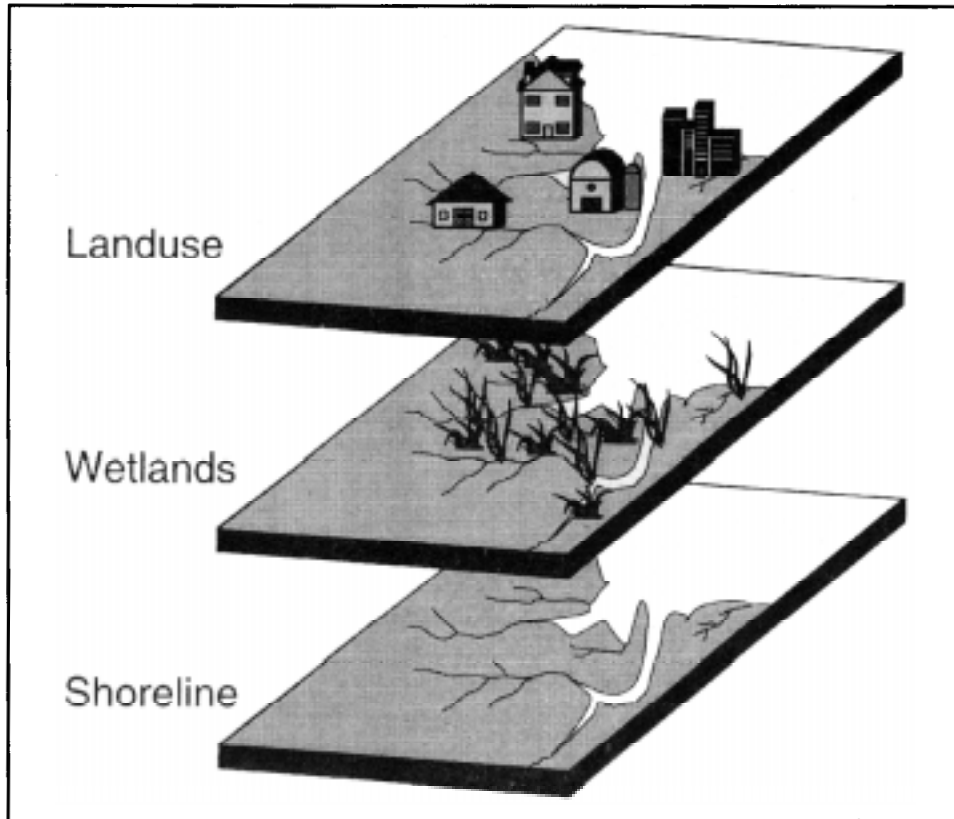
Geographic Information System, or GIS. GISs are computerized software programs which manage data in digital format in a spatially oriented environment. This means that each data element is referenced to a precise pair of x and y coordinates on the earth's surface.

GIS programs or packages are commercially available and vary in cost and sophistication. The CCI Program operates the Unix version of Arc/Info; possibly the most sophisticated and powerful GIS available today. The system has become widely used in resource management, landuse planning, planimetric mapping, and architecture. Since all data is referenced to geographic coordinates, GIS has the ability to display information in map format. Therefore, GIS is a digital mapping tool. More importantly, the

capabilities of GIS are highlighted by the ability for rapid retrieval, manipulation and display of large volumes of data.

GIS data is stored in a series of layers or coverages. Each coverage reflects a different data element. Most coverages are entered into the GIS through a host computer interfaced with a digitizing tablet. The tablet provides the electronic medium for transferring hardcopy map information into digital, geographically referenced data. Once the coverages are generated, the power of the GIS allows

retrieval of multiple coverages for a composite display of the various data elements. This is particularly useful to look at change in a data element over time, where layers representing different data collection periods are overlaid. Since the various data elements are referenced to a common map projection and coordinate



system, different data coverages can be overlaid to examine the environmental characteristics of a region.

This Program concerns itself primarily with resources within the tidal waters of the Chesapeake Bay watershed. The most critical coverage which forms the geographic infrastructure is the shoreline position, or the interface between the fastland and the water. Existing sources for shoreline data are found primarily in hardcopy map

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## Structurally Speaking....

### What Is Riprap?

Walter I. Priest, III

**R**iprap comes in all shapes and sizes and is made from so many different types of material that a simple definition is very elusive. After consulting a number of books on shoreline structures, highway engineering and sediment and erosion control, this is what I learned.

Shape is probably the most consistent characteristic because it is important regardless of the size or the nature of the material. Based on information from the Corps of Engineers and Virginia Erosion and Sedimentation Control Manual, the longest dimension of the unit should be no greater than three times its minimum dimension. These dimensions help

prevent large voids within a revetment that might compromise the integrity of the structure.

The size of riprap is more variable, depending on the design criteria

structure designed to cope with ocean waves.

Finally, riprap can be made of quarry stone or concrete and masonry rubble. With the rubble, though, the

material must be shaped as detailed above, i.e. no large slabs, and sized to accommodate the wave climate at the site, i.e. no very small pieces. Furthermore, all rubble should be free of asphalt, exposed metal such as reinforcing bar and other debris.

For additional information on riprap and revetment construction consult the *Shoreline Development Best Management Practice Manual* recently published

by the VMRC and the Virginia Wetlands Guidelines. 🐾

#### Riprap is divided into the following size classes in the Virginia Erosion and Sediment Control Handbook (1992):

Riprap Class/Type	Weight Range* (lbs.)	Requirements for Stone Mixture
Class AI	25-75	Max. 10% 75 lbs.
Class I	50-150	60% 100 lbs.
Class II	150-500	50% 300 lbs.
Class III	500-1,500	50% 900 lbs.
Type I	1,500-4,000	Av. wt. = 2,000 lbs.
Type II	6,000-20,000	Av. wt. = 8,000 lbs.

\* In all classes/types of riprap, a maximum 10% of the stone in the mixture may weigh less than the lower end of the range.

for the structure. Structures in relatively low energy environments can use much smaller units than a

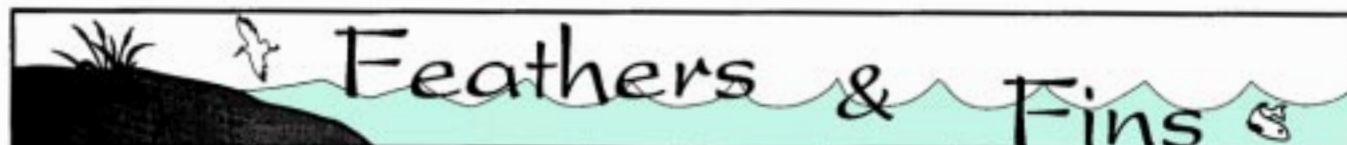
#### Mapping Our Coastal Inventory continued from page 3

products at various scales and resolutions. Initial efforts within the CCI Program focused on the transfer of these shoreline maps into digital format for inclusion in the GIS database.

For regional studies, the United States Geological Survey's (USGS) 1:24,000 scale (1"=2,000') topographic maps are a suitable base map for shoreline position. At the local level, large scale maps, which provide more detail, are more desirable. The Virginia Marine Resources Commission (VMRC) mapped the shoreline position in 1976 as part of their oyster ground monitoring program. This initiative produced a series of hardcopy maps at a scale of 1:5,000 (1"=417'). The CCI Program spent the better part of its first year transferring these maps into digital format to provide the database with a strong foundation upon which to build the natural resource inventory for the Bay watershed.

Since 1989, the CCI Program has expanded its GIS database to include coverages which delineate the Bay wide distribution of tidal wetlands, adjacent landuse, erosion control structures, general shoreline conditions, shellfish beds, the distribution of common local species, rare, threatened or endangered species, nesting grounds for birds, public parks, and the location of public and private marina facilities. Many additional coverages exist for selected areas of the watershed which are generated by the expressed needs of the localities, or as components of separate, but relevant, research programs.

*The Comprehensive Coastal Inventory Program is administered through the Center for Coastal Management and Policy at the Virginia Institute of Marine Science. ➡*



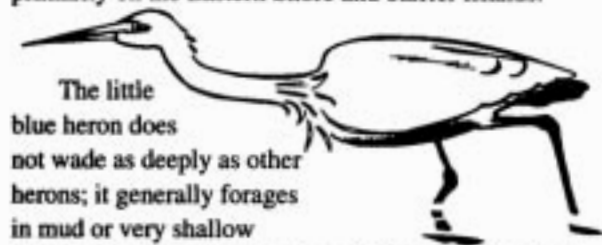
## Little Blue Heron

(*Egretta caerulea*)

Julie Bradshaw

The little blue heron is the only uniformly dark heron which regularly appears in Virginia. In adult plumage, it is slate blue-gray with dark legs. In breeding plumage, its head and neck are a dark reddish brown. Males and females are alike in appearance. At approximately 25-29 inches in length, it is smaller than the familiar great blue heron (38-54 inches). The other medium-sized dark heron regularly found in Virginia, the tricolored (formerly Louisiana) heron, has white undersides. Further south in its range, the little blue heron may be confused with the reddish egret which is a little larger, stockier, and lighter colored.

In the U.S., the little blue heron breeds from Massachusetts south to Florida on the Atlantic coast and throughout the coast of the Gulf of Mexico. On the Pacific coast, it breeds south of the U.S. The species generally winters in Florida and the Caribbean and south into South America. The little blue heron is common on the coast of Virginia from mid-April through mid-October. It breeds primarily on the Eastern Shore and barrier islands.



The little blue heron does not wade as deeply as other herons; it generally forages in mud or very shallow water. Its prey include fish, amphibians, invertebrates and insects.

In general, the little blue heron breeds near water, ranging from fresh to salt. It nests in mixed species colonies, often with the snowy egret (the small white egret with black legs and yellow feet) in Virginia. It nests low in trees or in shrubs. The nest is made of sticks and lined with twigs, reeds, or grass. The female constructs the nest with material provided by the male. Eggs are incubated by both sexes for a little over 3 weeks. The young leave the nest by 12 days after hatching and take short flights by 1 month. This species is unique among dark herons in that the young are entirely white during their first year of life.

The Virginia Department of Game and Inland Fisheries lists the little blue heron as a species of special concern. Its population in Virginia is declining, probably due to loss of habitat to coastal development.

## Cobia

(*Rachycentron canadum*)

Lyle Varnell

Cobia are popular sportfish both in the Chesapeake Bay region and worldwide. Incidental catches occur in the commercial fisheries, primarily in pound nets. The cobia is the only species in the family Rachycentridae, but are closely related to the remoras (Echeneididae) and more distantly related to the jacks (Carangidae). They are distinguished by their dark brown color, dark midside stripe about as wide as the




eye, forked caudal fin and a broad and flattened head. They have a large mouth with numerous teeth, and a projecting lower jaw. Cobia have been measured up to approximately six feet long and 150 pounds, although most caught are less than 60 pounds.

Cobia occur nearly worldwide in waters ranging from temperate to tropical. In the western Atlantic they occur from about Massachusetts to Argentina, including the Gulf of Mexico. Cobia do not occur in waters off of the United States' West Coast.

Adults are coastal and continental shelf fish, and only occasionally enter estuaries. When inshore, they are most commonly found around buoys, stationary structures such as pilings and over sandy bottoms.

*Continued on page 8*

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## Wetlands Delineation — The Dilemma Continues

Harold Jones and Jim Perry

Early man recognized and utilized the bounty of wetlands for centuries. He harvested finfish, shellfish, waterfowl, plants and furbearing animals, extracted peat for fuel and gathered cattails for roof thatching. Modern man still relies heavily on the resources wetlands produce, however, most wetlands suffer not from overdepletion of their resources but rather from filling or conversion. The rapid loss of wetland acreage, in part, prompted the passage of current federal wetlands regulations contained in Section 404 of the Clean Water Act. Regulating wetlands requires the establishment of point on the landscape where the agency's regulatory authority begins and ends. Early attempts to establish such limits usually revolved around defining a particular wetland system. In almost every case there was difficulty in describing the transition zone between totally dry and totally wet environs. The boundaries could not be easily distinguished, due to the diversity of plant species and wetland communities that exist under a wide spectrum of physical conditions.

In 1977 President Carter issued an Executive Order on the Protection of Wetlands which established a federal definition of wetlands. This definition defines wetlands as "those areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions."

Initial efforts to formulate and develop guidance for Corps field personnel based on the new Federal definition resulted in the production of a series of 9 regional guidebooks. In Virginia, the Corps utilized *The Preliminary Guide to the Onsite Identification and Delineation of Wetlands of the South Atlantic States* published in 1982. These regional guidebooks recognized the three main components of the wetlands definition; wetland soil, hydrology and vegetation. The guides provided a sound basis for delineation methodologies using the "multiparameter approach." However, they provided little help in structured data gathering, analysis or delineation methodologies.

During the infancy of federal wetlands regulation under the Clean Water Act, the Corps found themselves under increasing regulatory scrutiny by the regulated public, environmental groups and other agencies. A major issue centered around the perceived or real inconsistency of wetland delineations across the country. The Office of the Chief of Engineers and the Assistant Secretary of the Army (Civil Work) directed the Waterways Experiment Station in Vicksburg, Mississippi under the Wetlands Research Program. The purpose of this project was to develop guide-

lines for identifying wetlands that were scientifically sound, legally defensible, and universally applicable. The *Corps of Engineers Wetlands Delineation Manual*, published in January 1987, required positive evidence of hydrophytic vegetation, hydric soils and wetland hydrology for a determination that an area is a wetland. It provided technical guidelines for wetlands, deepwater aquatic habitat and nonwetlands (uplands).

By this time three other federal agencies involved in wetland protection, the EPA,

the Department of Interior Fish and Wildlife Service (FWS), and the U.S. Soil Conservation Service (SCS), had adopted their own manuals and/or methods for wetlands identification. Although also based on the best available science of the time, their versions and methods varied from that of the Corps, and to some extent, to each others. The use of the different methods lead to inconsistencies in determining wetland boundaries.

To overcome the inconsistencies, in 1988 the four federal agencies (Corps, EPA, FWS, and SCS) established a wetland definition and to set the criteria necessary to meet the definition. The result was the 89 manual *Federal Manual for Identifying and Delineating Jurisdictional Wetlands*.

Adopted by all four agencies, changes to the manual included a more concise (up to date) set of field indicators of hydrology (Figure 1). The list was interpreted by many consultants to allow the use of hydric soil as an sole indicator of hydrology (with no supporting evidence necessary).

### List of Hydrologic Field Indicators from 89 Manual

1. Visual observation of inundation
2. Visual observation of soil saturation
3. Oxidized channels (Rhizospheres) associated with living roots and rhizomes
4. Water marks
5. Drift lines
6. Water-borne sediment deposits
7. Water-stained leaves
8. Surface scoured areas
9. Wetland drainage patterns
10. Hydric soil characteristics

Figure 1



# Natural Places to Visit



## Seashore State Park

*Pam Mason*

**L**ocation: Virginia Beach. From the west, use I-64 to Route 60. Heading east on Route 60, the entrance to the visitors center is on the right. Park at the visitors center.

**Details:** The park is owned by the Virginia Division of Parks. The park is open all year from 8 am to dusk. There are over 22 miles of easy walking trails. Camping facilities are available spring through fall. The beach road and campgrounds are opposite the park entrance. In the summer, beach access is limited to overnight campers. For information contact: Seashore State Park, 2500 Shore Drive, Virginia Beach, VA, 23451, (804) 481-2131, or visitors center, (804) 481-4836.

The trails located behind the visitors center lead through old dunes habitat. The Bald Cypress Nature Trail passes through swamp pools between the relict dunes. The bald cypress is a deciduous evergreen which drops its needles in the winter. The tree has adapted to life in very wet soils. The function of the characteristic cypress knees as an adaptation to swamp life is unknown; however, theories suggest a role in gaseous exchange and a stability mechanism in the soft swamp soils. Growing among

the cypress branches is Spanish moss, here at its northern limit. The trees are only a resting place for the plant which draws nutrients and water from the surrounding air.

The swamp ponds are habitat for many species of amphibians and reptiles. The park is one of the northernmost locations for the eastern cottonmouth. Northern and red-bellied water snakes are commonly found around the swamp.

The vegetation on the old dune ridges which cross the swamp is very different. The woods are a mixture of loblolly pine, Virginia pine, white oak and southern red oak. The understory is dominated by American holly, sweetbay and devilwood.

The Great Dune runs along the northeastern boundary of the park. In some places it reaches 50 feet in height. Until recently it was mostly bare of vegetation. However, vegetation has appeared and now covers most of the dune. A similar dune is found on the outer banks of North Carolina. It is likely that these dunes formed in the same manner as other dunes along the shore, but how they became higher and steeper is unknown.

On the beach side of the park, there is the transition from open

beach to back-dune forest. Sea oats found on the front face and dune crest are important for stabilizing and building the dunes. Behind the dunes grow live oak, bluejack oak and wax myrtle. These southern species are more numerous than the black cherry and bayberry which are dominant further north.

The park, is a great place to observe many birds. Migrating species follow the Delmarva peninsula, cross the Chesapeake Bay and fly over the park. Look for migrating hawks in the fall. Around the swamp, look for migrating songbirds such as the prothonotary, hooded and Kentucky warblers in the spring and fall. Pileated woodpeckers are common.

Porpoises and dolphins in the bay are often visible from the shore. The Atlantic bottlenose dolphin, long-beak dolphin, common dolphin and Atlantic harbor porpoise are found in these waters.

Whether your interest is tidal or nontidal wetlands, birds, other vertebrates, plants, or just a nature walk, Seashore State Park offers an outstanding variety of activities which should appeal to anyone who subscribes to this newsletter. Have a great trip! 🐾

*Wetlands Delineation — The Dilemma Continues*  
continued from page 6

Many marginal areas were automatically classified as wetlands by those who were not familiar enough with the process to see their possible error. The results became a political out cry—although the 89 manual was intended to be a draft, the confusion and inconsistencies its use created led to problems that are still being resolved today. Today the primary agencies (Corps, EPA, FWS, and SGS) are working together to create one set of guides that can serve all areas equitably.

In March of this year the current administration, through the EPA, contracted the National Academy of Science (NAS) to study and recommend criteria and methods for identifying wetlands. The NAS study is slated for completion in 18 months. How the federal agencies will respond to the NAS findings is not yet clear. However, it is hoped that the information it will provide will give them a strong, scientific basis to build their wetland criteria, field indicators, and methods on. ➡



*Cobia**continued from page 5*

Cobia are found in the Chesapeake Bay when water temperature is above about 19° C (66° F).

In the Chesapeake Bay region male cobia mature as early as their second year (approximately 21 inches fork length). Females reach maturity as early as their third year (approximately 28 inches fork length). Spawning occurs in the Atlantic Ocean adjacent to the mouth of the Chesapeake Bay from about mid- to late June through mid-August. Eggs hatch in offshore waters. Juveniles move inshore and inhabit areas inside barrier islands, near beaches and lower reaches of estuaries.

Adult cobia are considered voracious carnivores. They feed primarily near the bottom, but have been documented to feed near the surface. Their prey include small bottom-feeding fish and various

<h2>Calendar of Upcoming Events</h2>	
May 30 - June 3	The Society of ASLO & SWS Annual Meeting Edmonton, Alberta, Canada Attending will be Dr. C. Hershner, Dr. G. Silberhorn, T. Barnard, K. Havens, J. Perry, W. Priest and L. Varnell
June 22 & 23	Wetlands Functional Assessment Workshop VIMS, Gloucester Point, Virginia For information call Pam Mason at 804-642-7158
July 9	Tidal Wetlands Workshop VIMS, Gloucester Point, Virginia For information call Maryann Wohlgemuth at 804-642-7395

benthic invertebrates, but they seem to prefer crustaceans. Shrimp and crabs are prevalent in the diet of the cobia. Cobia are dependent upon many prey species which are dependent upon tidal wetlands and beds of

submerged aquatic vegetation (SAV) during their life cycle. Thus, the cobia is a good example of how estuarine wetlands and SAV beds directly affect an oceanic fish species. ➡



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