The Virginia Wetlands Report

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Monkey Bottom Wetland Walkway: A Walk on the Wild Side

Jill Barnard

Norfolk has a new marsh thanks to the United States Navy and the 1972 Virginia Wetlands Act. The name of the created wetland is Monkey Bottom, although admittedly, monkeys are not among the array of wildlife common to this area. According to local lore, the rather peculiar name is derived from the story of two families who lived in a low lying part of Willoughby Bay, known as "the bottom," prior to 1940-41. Area residents, familiar with the families' fondness for exotic pets such as monkeys, would gather to listen to the "monkeys holler." Eventually, this became known as Monkey Hollow, and finally during the 1920's became Monkey Bottom.

The marsh was created by the Navy in response to wetlands regulations requiring responsible parties to compensate for the loss of natural wetlands. Willoughby Bay became a disposal area for dredged material in the early 1940's before modern wetlands regulations were enacted. The Navy obtained permission to place additional dredged material at the site in 1983, with the promise that 7 acres of wetlands would be developed to compensate for the resulting loss.

Begun in 1984, the area is now one of the largest planted wetlands in Virginia. VIMS scientist Walter Priest conducted a study in which the cover, density, and standing crop of Monkey Bottom marsh was compared to the same components of two area natural marshes. According to Priest, the comparison revealed that,"the planted marsh at Monkey Bottom appeared to be a viable and productive component of the estuarine system."

Regulations protecting wetlands are based primarily on the significance and actual value of wetlands themselves. Wetlands are home to hundreds of both plant and animal species. They provide nesting sites for the great egret, great blue heron, and clapper rail, and a haven for young fishes such as the striped mullet, spot, and menhaden. Plant life of a salt marsh is equally diverse, including the marsh elder, water hemp, salt marsh aster, and groundsel tree. Additionally, wetlands provide recreational sites, reduce erosion damage, and serve as a storage area for flood waters.

Monkey Bottom marsh may not eradicate the extensive loss of wetlands in Virginia over the past several years, but it is certainly a step in the right direction. Visitors can enjoy the area from an observation deck built by the City of Norfolk. Construction, which began in July 1993, was funded by the Virginia Coastal Resources Management Program.

Monkey Bottom

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Originally proposed by Carvel Blair, former Chairman of the Norfolk Wetlands Board, the observation deck serves both educational and recreational purposes. According to Lee Rosenberg, Manager of Environmental Services for the city of Norfolk, a number of interested local residents have visited Monkey Bottom. However, travellers from out-of-town account for the majority of visitors. From the Information Center, many visitors walk just outside the building to the pier and admire the newly created marsh. Interpretive displays provide information on the marsh. The site is also popular among classes from nearby Willoughby Elementary School. The close proximity of the marsh makes it a convenient field trip destination for students curious to learn more about Virginia's coastal resources.

The original creators of the Monkey Bottom Wetland Walkway hoped the project would serve as both an educational tool and a recreational opportunity for incoming tourists and local residents alike. At this point, the project seems to be fulfilling its intended purposes. Those interested in visiting Monkey Bottom Wetland Walkway can find it just south of the Chesapeake Bay Bridge-Tunnel on Interstate 64 at the Norfolk tourist information center.

The Virginia Wetlands Report

Wetlands Program

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Wondering about Wetlands

Q *From an environmental viewpoint, why is riprap preferred over bulkheads?*

A If a bulkhead is constructed in the intertidal area and is backfilled, it permanently removes intertidal habitat from the estuarine system. While riprap may displace more of the intertidal area, it will in time become a rocky habitat of its own. The many crevices created by the multi-faceted surface of the stones provide shelter, attachment, and foraging space for many organisms. In addition, the rough surface and slope of riprap dissipates the force of waves as they move landward while bulkheads tend to reflect wave energy in all directions and may result in scouring of the area at the bulkhead toe. Also, sediment may be trapped and deposited in the riprap and subsequently become vegetated with marsh grasses. Finally, riprap generally has a design life considerably longer than a timber bulkhead and requires no treatment with toxic substances.

Q *How do marsh grasses act to reduce erosion and stabilize sediments along shorelines?*

A Incoming waves strike grass stems and leaves which act as a baffle slowing water movement and dissipating the wave's stored energy. Heavier suspended particles of sand and silt settle out as the water movement diminishes. The extensive network of fine roots and rhizomes trap these sediments and hold them in place, resulting in accretion or building of the beach area. Research has shown that the higher the density of the marsh grasses the more effective they are at wave energy dissipation and sediment retention. In areas of high wave energy, the constant flexing of the marsh grass stem results in breakage and the eventual failure of the marsh grass ecosystem. In protected areas, with low fetch and low wave energies, vegetated wetlands act as effective deterrents to erosion.

Thanks for your questions! We know there are other concerned citizens who have questions about our Bay and its wetlands. Let us hear from you! —ed.

Feathers & Fins

Louisiana Waterthrush

(Seiurus motacilla)

Julie G. Bradshaw

The Louisiana waterthrush is one of the first migrant warblers to arrive in our area in the spring. After wintering in the central Mexico/West Indies/northwest South America area, it arrives in Virginia's coastal plain in about mid-March, and can be seen in the area until mid-to late-September. This bird is usually found on or near the ground along wooded streams and in wooded swamps. It feeds on insects and builds its nest on the ground along the stream banks, in the underbrush, or among exposed tree roots.

The Louisiana waterthrush is a warbler, but resembles the thrushes and shows a preference for living near water, hence its name. Its scientific name, *Seiurus motacilla*, is derived from Latin words which mean "water wagtail," describing an important characteristic which distinguishes the Louisiana waterthrush from many other birds. Unlike most birds, whose mode of moving while on ground is to hop, the Louisiana waterthrush walks. As it walks with a springing motion, it continually bobs its head and upper body, and raises and lowers its tail.

One of the many species which can be described as "small brown birds," the Louisiana waterthrush has a brown back and a white eyebrow stripe, and striped underparts. It is about 6 inches in length, which is a little larger than most warblers and sparrows, and a little smaller than the thrushes. The most similar species with which it may be confused is the northern waterthrush, which is thought to breed in Virginia but is more likely to be seen here in migration. The northern waterthrush is quite similar in appearance, with a buffy or yellowish, rather than white, eyebrow stripe, and a spotted throat, rather than the Louisiana's usually clear throat. Both species are sometimes difficult to see because of their coloring, size, and habitat; but if you listen in the right places, both are relatively easy to hear because of their loud and distinct vocalizations. The call note of both species is a loud, sharp "chink" (National Geographic Society) or "chip" (Peterson). Their songs are similar but distinguishable; the northern waterthrush's song is described as "a vigorous, rapid twit twit twit sweet sweet sweet chew chew chew." The Louisiana

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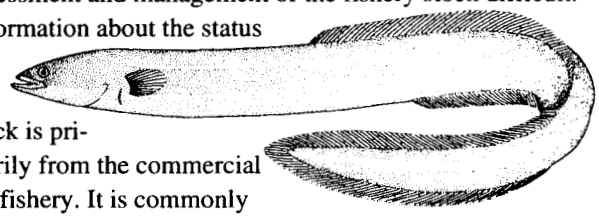
American Eel

(Anguilla rostrata)

Lyle Varnell

The American eel is a unique member of the Chesapeake Bay fauna in that it is the only true catadromous fish species. A catadromous species' developmental behavior is opposite that of anadromous species such as shad, alewives and striped bass. Eels spawn in the open ocean and adults inhabit freshwater and estuarine areas. This behavior makes assessment and management of the fishery stock difficult. Information about the status of the stock is primarily from the commercial eel fishery. It is commonly believed that the Chesapeake Bay eel stocks are less abundant than in the past and that the average size of eels commercially exploited is becoming smaller due to market demand. American eels have been commercially exploited since colonial times when they were the bait favored for blue crab trotline fishery. Today, eels trapped commercially in the Chesapeake Bay are exported to Asian and European markets.



The American eel is a bony fish belonging to the Order Anguilliformes and the Family Anguillidae. It is closely related to the European Eel, *Anguilla anguilla*, and is similar in appearance to the deep water conger eel. *A. rostrata* has a snake-like body with smooth skin (the scales are minute and embedded). The dorsal fin is continuous with the caudal and anal fins. Adults are yellowish brown to greenish brown. Females may reach sizes up to 1.4 meters in length. Generally, males are distinctively smaller. Lifespan can reach 18 years.

American eels inhabit coastal, estuarine and freshwater areas throughout eastern North America. Populations extend to northern South America, the Bahama Islands and selected islands of the West Indies. Females seem to prefer lower salinity and freshwater areas, while males are generally found in greater proportions in brackish and estuarine waters.

Female eels reach maturity at 3-5 years. Males mature earlier, reaching adulthood after approximately 2 years. Adult eels are believed to spawn and die in the Sargasso Sea and between Bermuda and the West Indies. Spawning oc-

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Natural Places to Visit

Corrotoman River Nature Trail

Pam Mason

Location: The trail is located in Lancaster County. The parking area is on Route 3 approximately 1/2 mile east of Lancaster.

Details: Owned by the Chesapeake Forest Products Company, the trail is 1.6 miles long. The trail is self-guided and guide booklets are available in the parking area. It is suggested that groups of more than 12 call in advance to ensure sufficient guidebooks and to avoid conflicts. Numbered stakes along the trail correspond with descriptions in the guide book. Hiking is permitted only during daylight hours. For further information contact: Chesapeake Forest Products Company, Eastern Virginia Region, 15th & Main St., West Point, VA 23181, phone (804) 843-5402.

The trail provides some insight on the economic value of many the plant species, particularly trees, common to Virginia's coastal plain. Historically the site was harvested for timber and included a sawmill. Look for evidence of forestry activities along the trail.

Running along the Corrotoman River, the trail passes through forested communities and provides several vantage points to view the wetlands along the river. The trail follows the river moving downstream and observation points provide the opportunity to observe the changes in wetlands vegetation along the river. Moving along the trail, the first river viewpoint is an observation deck providing a great view of the river. The wetlands are freshwater and are vegetated with common species including; pickerel weed, arrow arum and arrowhead. Other wetland plants observable from points along the trail are species more typical of brackish wetlands including: big cordgrass, cattails, saltmarsh fleabane and saltmarsh aster. Blue herons, egrets, osprey, several species of ducks, beavers and muskrats are some of the species you may observe in the wetlands.

The trail begins in a forested area dominated by yellow poplar, red maple, sweetgum and sycamore. Marked points along the trail introduce you to many other common trees including: white oak, chestnut oak, mockernut hickory, black cherry, and a tree prized for both furniture making and food— the black walnut. The forest is populated by wild turkey, white-tailed deer, raccoons, and skunks.

If you plan your trip for the right time of the year, you may observe some of the more "showy" wetlands and upland plants in flower. In the wet areas look for blueflag iris (blooming May to July), cardinal flower (blooming July to September), butterfly-weed (blooming June to September), Jack-in-the-pulpit (blooming April to June) and the atamasco lily (blooming April to June). In the drier woods look for showy orchid and pink lady's slipper (both blooming April to June).

American Eel
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curs in the upper 100 fathoms of the water column from January to July. Females generally release from 0.5-2 million eggs, but larger individuals may release as much as 8.5 million eggs. Eggs hatch and larval development begins in the open ocean, near the spawning area, in waters of approximately 35 parts per thousand salinity and greater than 60° Fahrenheit. The first two larval stages, referred to as Leptocephali, may last up to one year. Two "glass eel" stages follow the Leptocephalus stages. Transformation to the first glass eel stage is complete by the time the larvae are transported to North American coastal waters. Glass eels metamorphose into "elvers" in nearshore and estuarine waters. Elvers begin upstream migration during the winter, preferring to move at night. During daylight, they may burrow in the bottom or rest in deeper water. The elver stage, lasting only a few months, is followed by the "yellow eel" stage. The yellow eel stage lasts until sexual maturity. Mature eels are commonly called "silver eels." Spawning migrations to the ocean occur during the winter and early spring.

American eels from the elver stage through maturity exploit vegetated wetlands and beds of submerged aquatic vegetation (SAV). These areas are used for feeding and predator avoidance. Adults are bottom-feeding omnivores. Their diets include crustaceans, annelids, fish, echinoderms, molluscs and eel grass.

Structurally Speaking...

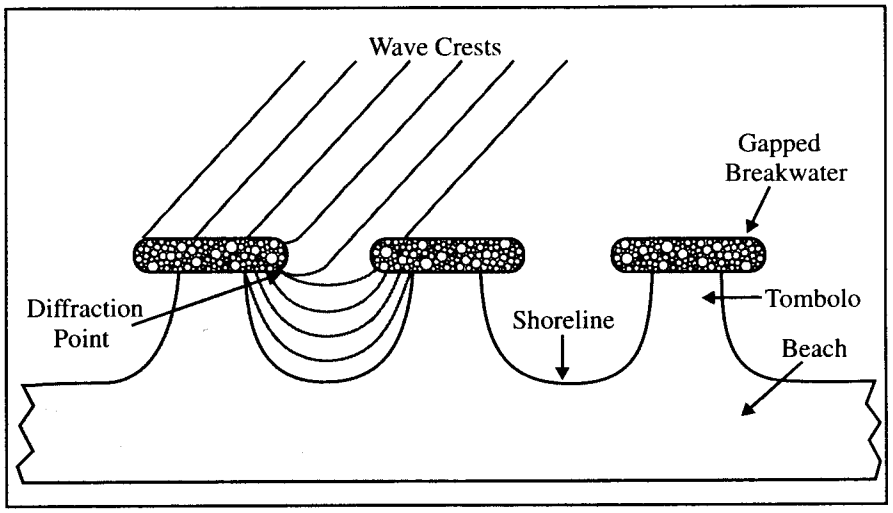
Gapped Breakwaters

Walter I. Priest, III

A beach is one of the best natural means of erosion control. The sloping nature of a beach provides a natural dissipator for wave energy and shoreline protection. However, beaches are dynamic and vulnerable to short-term profile fluctuations from storm events that can allow direct wave attack on the toe of the adjacent upland bank.

The size and shape of beaches is due in large part to the movement of sand along a shoreline in response to the local wave climate. The direction that waves approach the beach varies with the wind direction. Consequently, a particular sand grain may move back and forth along a shoreline depending on the direction of the waves breaking on the shore. This leads to a net movement of the sand in one direction or the other according to the dominant wave direction. If the dominant direction of wave approach is perpendicular to the beach, the sand tends to move on to and off the beach instead of along the shoreline. This minimizes the movement of the sand up and down the beach.

Gapped breakwaters are a series of quarry stone structures placed offshore and parallel to an eroding shoreline. They are designed to take advantage of the minimal longshore movement of sand when waves break perpendicular to the beach. Breakwaters diffract or bend the incoming waves through the gaps so that they break perpendicular to the shoreline regardless of their original orientation (See figure). The protection afforded by the breakwaters together with the altered wave climate encourages the stabilization as well as accumulation of sand on the beach landward of the structures. Increased elevation of the new beach helps protect the base of the upland bank from frequent attack by storm waves, thereby reducing the shoreline erosion rate.



Design of these structures is dependent on a number of factors including the orientation of the shoreline, fetch, nearshore bathymetry, wave climate and shoreline conditions. The length, gap, height and distance offshore of the breakwaters are all based on the above parameters and are unique to each shoreline (C. Scott Hardaway, personal communication).

While this approach to shoreline stabilization is "softer" than other methods such as bulkheads and

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Earthwatchers Witness Change in the Chesapeake

Jill Barnard

Tanzanian folklore. Edmund Spenser's Castle. Caribbean shipwreck. Dolphin intelligence. Coral Gardens of Tonga. What do each of these have in common? Each is an example of a topic of research in which Earthwatch volunteers are involved. There are almost 150 different projects worldwide from which to choose.

According to the July/August 1994 edition of *Earthwatch* magazine, "the mission of Earthwatch is to improve human understanding of the planet, the diversity of its inhabitants, and the processes that affect the quality of life on earth." This is accomplished by inviting volunteers to accompany scientists into the field to assist in research activities. The participants pay a fee which covers their food and lodging, as well as a portion of the project cost. Earthwatch volunteers contribute time and money, and bring their enthusiasm to projects, including one right here on the Chesapeake Bay.

Dr. James Perry III and Sharon Dewing, both of the Virginia Institute of Marine Science, are involved in ongoing research on the wetlands of the Chesapeake. Perry was contacted by Earthwatch in 1990, and now in 1995, he is entering his fifth year of affiliation with Earthwatch. His research is funded primarily by NOAA, although he said that the assistance provided by Earthwatch volunteers is invaluable.

During the growing season which is May through September, groups of Earthwatch volunteers accompany Perry and Dewing to the designated wetlands for one week during each month. The four wetland sites, located at various points along the York River, a major tributary of the Chesapeake Bay, are representative of the different salinity regimes of the river. As a result, they each support a unique plant community and in total a highly diverse array of plant and animal life.

Catlett Islands

Perry, who is in charge of the project, stated that the purpose of the research is to establish baseline information on what is in the visited wetlands along the lines of plant life, in other words describe the vegetative patterns present. During visits to the Goodwin and Catlett Islands, Taskinas Creek and Sweethall Marsh, Earthwatchers assist in the compilation of data on the vegetation in each location and also according to Dewing, manage to "have a really good time" in the process. Perry explained that a second purpose of the project is to monitor changes that take place in the system due to changing environmental conditions such as an increase in sea level. Dewing noted that one obvious change is the complete submergence of one of the plots. Since the research began in 1990, the plot has been completely covered with water, and as a result its vegetation has disappeared and can no longer be analyzed with the other plots.

A wide range of Earthwatch members have been attracted to Perry's project. Many have been teachers hoping to pass on their newly discovered knowledge to their students. Others have been students themselves. Also involved have been a biochemist, an engineer, a soil agronomist, and an artist as well as an assortment of representatives from various other fields, all drawing a little something different from the experience.

No matter what the profession, according to Dewing and Perry, the volunteers share a commitment, an interest, and a genuine desire to learn about the earth. "These people are very conscientious. They are meticulous in their field techniques because they realize the importance of the correct figures in order to generate accurate data," said Dewing. Their interest allows them to both gain from and contribute to the project.

Geographic Information Systems

Comprehensive Coastal Inventory Develops New Tidal Wetlands Inventories

Marcia Berman

From the mid-1970's to early 1990 the Wetlands Program at the Virginia Institute of Marine Science published a series of inventories which delineated the boundaries of tidal wetlands for each coastal county, city, or township in Virginia. The effort took nearly twenty years to complete, and the inventories still serve as valuable management tools for planners, regulators and researchers.

Despite environmental legislation to protect tidal wetlands, development pressures continue to consume a percentage of our remaining marshes. Just what remains in not well known. Few studies have been initiated since the late 1970's when data collection for the Tidal Marsh Inventory Series was complete.

Today, the Comprehensive Coastal Inventory Program (CCI) at VIMS, in cooperation with the Wetlands Program, is developing new Tidal Marsh Inventories to bring our current knowledge of this resource up to date. Where the original inventories relied on field observations for much of its data collection, the second series will use remote sensing techniques to delineate and map marsh vegetation patterns.

Remotely sensed data can include satellite imagery, videography, and aerial photography. CCI is using recent high altitude color infra-red photography as its data source to develop this update. The photography has been scanned at high resolutions to yield a digital image product with a resolution of 1.5 meters. The image processing software ERDAS is used to classify the digital image based on different signatures inherent in color infra-red photography. On infra-red film, tidal marshes have a very distinct signature which allows the software to select out the tidal marsh areas and quantify the coverage. The exhaustive efforts once required to field map wetland boundaries are no longer an impasse to the timely development of inventory products.

The original inventory series included location maps which outlined the boundaries of marshes and accompanying tables which characterized the wetland type and reported percent cover and total acreage. The new series includes computer generated color illustrations of the imagery which highlight the classified wetlands. Tables which report the acreage of wetlands present are also planned for the new inventories.

Since remotely sensed data has not been refined to the extent that allows for cost effective classification of wetlands to the species level, a select number of wetland areas will be chosen from each county to serve as reference sites. These reference wetlands will be surveyed in the field for species composition in much the same manner as the original inventories. The purpose of the reference sites is to monitor for natural and anthropogenically induced change. In particular, emphasis will be placed on identifying alterations in community structure which might be attributed to changes in salinity regimes due to sea level rise. The number of reference wetlands selected for each county inventory will vary depending upon variability in wetland types and community structure within a locality. These reference wetlands will be routinely monitored for change and reported in each inventory update.

Louisiana Waterthrush
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waterthrush song also starts with a triplet, this one of "slurred whistles," and then disintegrates into a "jumble of twittering notes."

The Louisiana waterthrush is one of the neotropical migrants whose numbers are declining. Preservation and enhancement of habitat, specifically mature forests and wide streamside buffers, may help halt further decline of the species.

References for vocalizations:

National Geographic Society. 1983. Field Guide to the Birds of North America. National Geog. Soc. Washington, D.C. 464 pgs.

Peterson, R.T. 1980. A Field Guide to the Birds East of the Rockies. Houghton Mifflin Co. Boston. 384 pgs.

Gapped Breakwaters
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riprap, it still has an impact on shoreline processes, particularly downdrift of the project. These impacts can be addressed in a number of ways using short groins, modified breakwaters or revetments.

There are some additional advantages in this approach to beach stabilization that make gapped breakwaters desirable from other perspectives. First is the maintenance of intertidal wetland and shallow subtidal habitats as well as beach areas that can be used for recreational purposes. Also, the beach and backshore areas can be planted with dune and wetlands plants that will help stabilize the shoreline and trap additional sediments.

Calendar
of Upcoming Events

May 18-19, 1995	22nd Annual Conference on Ecosystems Restoration and Creation. Tampa, Florida. Contact: Dr. Frederick J. Webb, Hillsborough Community College, Plant City Campus, 1206 N. Park Rd., Plant City, FL 33655 (813) 757-2104
May 28-June 2, 1995	16th Annual Meeting of the Society of Wetland Scientists: "Wetland Understanding, Wetland Education." Cambridge, Massachusetts. Contact: Robin Reiner, Registration Coordinator at (508) 667-3079
November 12-16, 1995	Estuarine Research Federation Conference '95 "Estuaries: Bridges from Watersheds to Coastal Seas." Corpus Christi, Texas Abstracts deadline: June 15, 1995. Additional information will be in the next *Wetlands Report.*

Wetlands Program

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