The Virginia Wetlands Report

Spring 1996
Vol. 11, No. 2

Wetlands Program

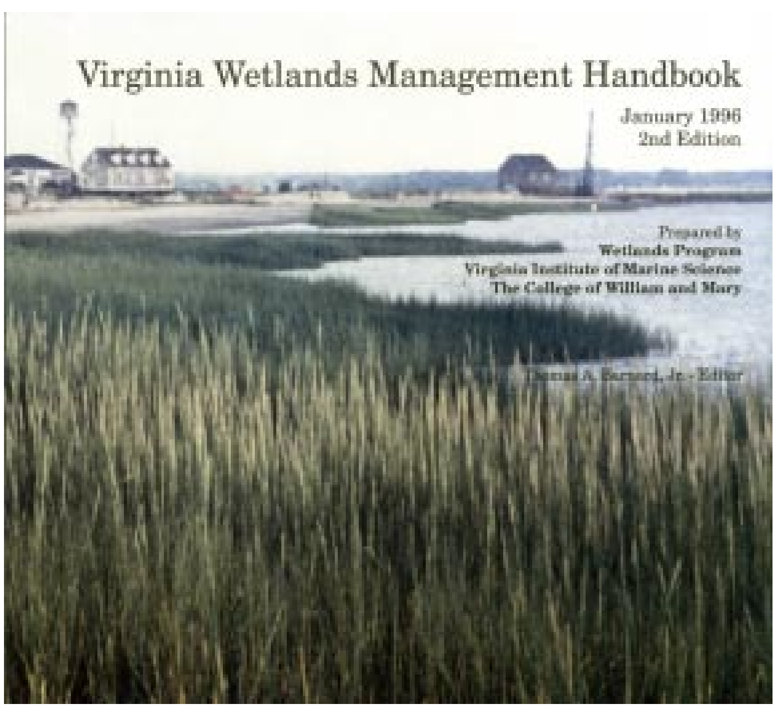
Second Edition of the *Virginia Wetlands Management Handbook* Now Available

Completely Updated

The Wetlands Program of the Virginia Institute of Marine Science has completed its update of the *Virginia Wetlands Management Handbook*, and with the aid of the Marine Resources Commission's Habitat Management Division, is distributing new inserts to replace the out-of-date materials in existing Handbooks. Updating of the Handbook was made possible through a NOAA Coastal Resources Management Program Grant, administered by Virginia's Department of Environmental Quality. The first edition of the Handbook was produced and distributed in 1991. Copies were supplied at no cost to all local wetland board members, their staff support, the Commissioners of Marine Resources, the environmental engineers at VMRC, to federal regulatory and resource agencies, wetland scientists at VIMS, and to various state agency personnel who interface with the shoreline permit program in Virginia on a regular basis.

The Handbook was originally designed to be a one-stop source of information and supporting documentation for tidal, and to a limited extent, nontidal wetlands managers in Virginia. The handbook materials are contained within a three-ring binder so that as new technical reports, regulations, policy statements, etc., are distributed by VMRC or VIMS, they can be added to the book and updating is facilitated. Because of the costs involved, only about 300 of the Handbooks are in circulation and they are to be passed on to new board members and staff persons as attrition occurs.

Since the first edition was published, a number of factors contributed to the decision to conduct a major upgrade of the entire document. First, the Division of Legislative Services, at the behest of the General Assembly, restructured the sections of the Code of Virginia dealing with wetlands and dunes. The tidal wetlands and coastal primary dunes ordinances were revised to conform to a more standardized legislative format and were moved into Title 28.2 of the Code where they became Chapters 13 and 14, respectively. This change affected all sections of the handbook where the ordinances were referenced to the Code. In addition to normal name, address and phone number updates, technological advances required the addition of fax numbers, not in use when the original volume came out. It also offered the opportunity to expand several segments of the document and to incorporate an erosion advisory article, originally intended to be included in the first edition but found to be infeasible at that time.



New in the Second Edition

The new Handbook has been completely revised and updated with new numbered tabs that make it easier to locate specific sections under major categories. The erosion guidance chapter, *Shoreline Erosion Guidance for Chesapeake Bay: Virginia*, has

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Handbook
continued from page 1

been authored by VIMS coastal geologist, Scott Hardaway, and presents a valuable perspective on shoreline management strategies along with advice on the deployment of specific erosion control structures. Also new is guidance for the implementation of wetlands mitigation/compensation in tidal areas of Virginia. This guidance is illustrated with a specific example in an attached appendix.

The marina section contains a selected bibliography in addition to the state marina guidelines. A bibliography, dealing with articles written specifically about Virginia's wetlands and dune protection program, is included for the first time.

Broader Availability

With the publication of the second edition of the handbook, a limited number of copies will be available for sale to the general public. The cost is $65.00 plus $7.50 shipping and handling.

Make checks payable to VIMS: Ref. acct. 111261.

Send to:
Wetlands Program
Virginia Institute of Marine Science
P.O. Box 1346
Gloucester Point, VA 23062
Atten: VIMS Cashier
FAX orders: (804) 642-7179
Telephone: (804) 642-7380

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Address corrections requested.

Program Director:
Dr. Carl Hershner
Head, Wetlands Advisory Program:
Thomas A. Barnard, Jr.
Produced by:
VIMS Publication Center

In this Issue:

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General Assembly Passes, and Governor Signs Wetlands Mitigation Banking Legislation

Wetlands mitigation banking may have taken a step forward in Virginia with the passage of House Bill 1123, which has added sections on wetlands mitigation banking to both the state Wetlands Act and the Virginia Water Protection Permit program (401 Certification).

Wetlands mitigation banking is the practice of generating compensation credits for future wetlands losses through: (a) the creation of new wetlands from non-wetland areas, (b) restoration of generally non-functional wetlands, and (c) the enhancement or preservation of existing wetlands. Banking is implemented through the debiting of credits in a bank (area of created or restored wetlands) by applicants with required compensatory mitigation. Various methodologies are employed to decide what "currency" will be used to set up the bank and to operate the credit/debit transactions. At present, the most common policy involves acre for acre or other standard areal measurement for the transaction units.

The new legislation allows any permit recipient whose activity is conditioned upon compensatory wetland mitigation for adverse impacts to wetlands, to use mitigation credits to satisfy all or any part of their compensation requirements. These credits are authorized to come from any approved mitigation bank that is operating in accordance with the Federal Guidance for the Establishment, Use and Operation of Mitigation Banks. Additionally, the law requires that (1) the bank be in the same USGS cataloging unit, as defined by the Hydrologic Unit Map of the United States (USGS 1980), or an adjacent unit within the same river watershed as the impacted site; (2) the bank is ecologically preferable to practicable onsite and offsite individual mitigation options, as defined by federal wetland regulations; and (3) the banking instrument, if approved after July 1, 1996, has been approved by a process that included public review and comment.

The law also authorizes the Commonwealth Transportation Commissioner (VDOT) to authorize the expenditure of funds for the purchase of compensation credits provided the bank is operating under the same federal regulations and meets the additional three requirements just listed above for wetlands and water protection permits.

Additional information and details will be discussed in future newsletters.

Feathers & Fins

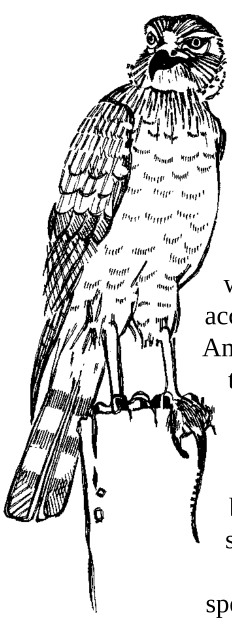
Northern Harrier, or Marsh Hawk

(Circus cyaneus)

Julie Bradshaw

The northern harrier, also known as the marsh hawk, is a bird you are likely to see if you spend much time in or near large marshes or brushy fields. It is a relatively large hawk (length 17-23 inches, wingspan 38-48 inches—approximately the size of red-shouldered and red-tailed hawks), with a long tail and long slender wings. In its foraging mode, it is difficult to mistake for any other bird. It forages fairly low (10-30 feet) over marshes and fields, with wings upraised in a slight V-shape, searching for mice, other small mammals, frogs, small birds, and other similar prey. The name "harrier" is derived from "harrying," referring to the way it pursues its prey and defends its territory.

Male and female harriers are different in size and coloration. Females are more likely to be seen, are larger, and are brown in color. Adult males are smaller and are gray in color. All northern harriers have white rumps which, along with the low foraging flight, distinguish them from other hawks. Harriers are most commonly seen in Virginia during migration and in winter (i.e., mid-August to May). Sightings during the rest of the year are also possible, as Virginia is the southern end of the breeding range for northern harriers on the Atlantic coast of the U.S. Harrier populations suffered from eggshell thinning due to DDT use against insects in the 1960's and 1970's. Populations have recovered since DDT was banned.



Frances Hamerstrom (1986) has written an entertaining and easily read account of her 24 years studying harriers. Among other discoveries, she found that the harrier population experienced highs and lows that followed the cyclic highs and lows of the populations of voles (also called meadow mice) at the birds' primary prey at Hamerstrom's study sites in the midwest.

Male harriers employ an apparently spectacular flight during courtship. Hamerstrom refers to this as "sky-dancing," and quotes a description of this flight by Breckenridge (1934): "The bird, in a very evident state of excitement, dived from a height of about seventy-five feet at a very steep angle for perhaps fifty

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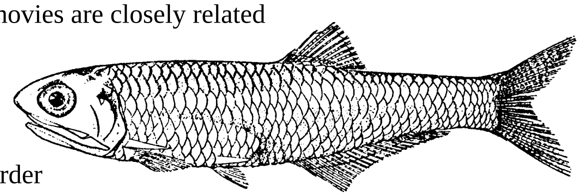
Bay Anchovy

(Anchoa mitchilli)

Lyle Varnell

The bay anchovy is an important player in the ecology of the Chesapeake Bay. It is a primary prey species of higher order piscivores such as striped bass, bluefish and other commercially and recreationally important finfish species. It is used as bait in the recreational fishery, but is not otherwise commercially exploited in Virginia. The bay anchovy is arguably the most abundant fish in the Bay, with the probable exception of the Atlantic silverside (*Menidia menidia*). The geographic range of *A. mitchilli* extends from the Gulf of Maine along the entire east coast and Gulf of Mexico to Mexico's Yucatan Peninsula.



Anchovies are closely related to herrings: both belong to the Order Clupeiformes. However, anchovies are members of the Engraulidae family. The only other anchovy found in the Chesapeake is the striped anchovy (*Anchoa hepsetus*). The striped anchovy is larger, less numerous, and prefers deeper water than the bay anchovy. The bay anchovy is characterized by a single dorsal fin located mid-body and beginning immediately above or very slightly anterior of the anal fin. Other distinguishing features include an inferior mouth, narrow silvery ribbonlike stripes along each side of the translucent body, and large eyes compared to body size. *A. mitchilli* is commonly confused with *M. menidia*, but the two may be easily distinguished. The Atlantic silverside is opaque, has two dorsal fins, and has a smaller mouth.

The bay anchovy is most common in brackish waters, schooling in shallow bays and estuaries along its range. It has been documented to occur in up to 120 feet of water along the continental shelf, and has also been collected in freshwater areas in the upper reaches of estuaries. *A. mitchilli* is a year-round resident of the Chesapeake Bay, overwintering in the Bay's deeper waters.

Spawning occurs from May to August in water less than 20 meters deep. Eggs are transparent and pelagic, but become demersal with advancing development. Larvae (approximately 2mm in length) hatch in approximately 24 hours. Larvae hatched in the upper water column soon descend to the bottom. Juveniles prefer shallow water, schooling closer to shore than their adult counterparts. Maturity is reached in approximately 2-3 months and 35-40 mm length.

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Natural Places to Visit

Westmoreland State Park

Pam Mason

Location: The park is located in Westmoreland County. To reach the park, travel east on Route 3 to Route 347. Park entrance is on the left, go about 1 mile to the contact station.

Details: The park is owned by the Virginia Division of State Parks and is open year-round. There is a small parking fee. Available activities include: cabin and tent camping, campstore, restaurant, swimming in the pool, hiking and picnicking. Paddle boats and rowboats may be rented, and there is a boat launch. Reservations for camping are made by calling 1-800-933-PARK. For specific information about the park, or the availability of special programs, contact the park at 804-493-8821.

The park is located on rolling terrain along the Potomac River. Deep ravines have been cut into the cliffs along the river by centuries of natural erosion. At the bottom of the ravines, material eroding from the cliffs has created a small beach on the river. Adjacent to the beach is a broad expanse of marsh.

An easy walking trail, Big Meadow Interpretive Trail, provides an opportunity to view the varied natural habitats at the park. The trail begins in the upland woods comprised of oaks, tuliptree, and red and silver maples. Evergreen mountain laurel and rhododendron, along with many dogwoods, provide spring color.

Take a small side trail to the beach and observe the cliffs. The many colored layers of material in the cliffs result from varied sources of sediment deposited over 5 million years ago. At that time, this area of Virginia was covered with a shallow sea, and the rivers carried sediment from the Appalachian highlands to the sea. The cliffs are the result of the sediment which settled to the sea floor. Fossils of marine animals such as whales and sharks are embedded in the cliffs. The different colors and mixes of the sediment provide clues to the type of environment in which they were deposited. The sandy layers were deposited in the shallow ocean, courser material was deposited by the rivers, and the fine material was deposited in a quiet, low energy environment. As sea level retreated and the shoreline moved toward its present location, the Potomac River cut through the river valley, and exposed the cliffs.

Continue on to Turkey Neck Trail to view Big Meadow. The freshwater marsh is vegetated with cattails, arrow arum, and pickerelweed.

The park is a good place to observe many species of birds. From the beach in the winter you may observe numerous of waterfowl such as buffleheads, Canada geese, and canvasbacks. In the warmer months look for wading shorebirds, loons and horned grebes along the shoreline and in the marsh. The upland woods are populated with turkeys, and keep your eyes open for the bald eagles that are resident in the area.

Northern Harrier, or Marsh Hawk
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feet, when it "zoomed" up again to about the original height where it turned over sidewise like the wings of a wing nut being turned onto a bolt. The aviator refers to this as a "barrel roll." In this inverted position the bird beat its wings two or three times, then righted itself by the same sidewise turn, generally in the reverse direction, and again dived into the great dip to repeat the performance again and again." Hamerstrom describes another interesting aerial display of the harriers, that of transferring food in mid-air. The males apparently fly in a special way to signal the female that they are about to transfer prey. The female comes up as the male flies high over the nest. The female flies beneath the male and swings her talons up to catch the prey as the male drops it. (Makes you want to go hawk-watching, doesn't it?)

Harriers require a large area in which to forage, and so are dependent in coastal Virginia on extensive marshes. In his study of marsh-nesting birds, Watts (1992) found that harriers were only present on the largest of his study marshes (>160 acres) and not on other smaller marshes (25 ac. or less). Management for harriers in Virginia should include preservation of large contiguous marshes.

References:

Breckenridge, Walter John. 1934. An ecological study of the marsh hawks (*Circus hudsonius* L.) of a Minnesota sand plain community. Univ. of Minnesota. Masters Thesis. 85 pp. (pp.30-31).

Hamerstrom, Frances. 1986. Harrier, hawk of the marshes: the hawk that is ruled by a mouse. Smithsonian Institution Press. Washington, D.C. 171 pp.

Watts, Bryan D. 1992. The influence of marsh size on marsh value for bird communities of the lower Chesapeake Bay. Va. Dept. Of Game & Inland Fisheries, Nongame and Endangered Wildlife Prog. Technical Report No. 1. 115pp.

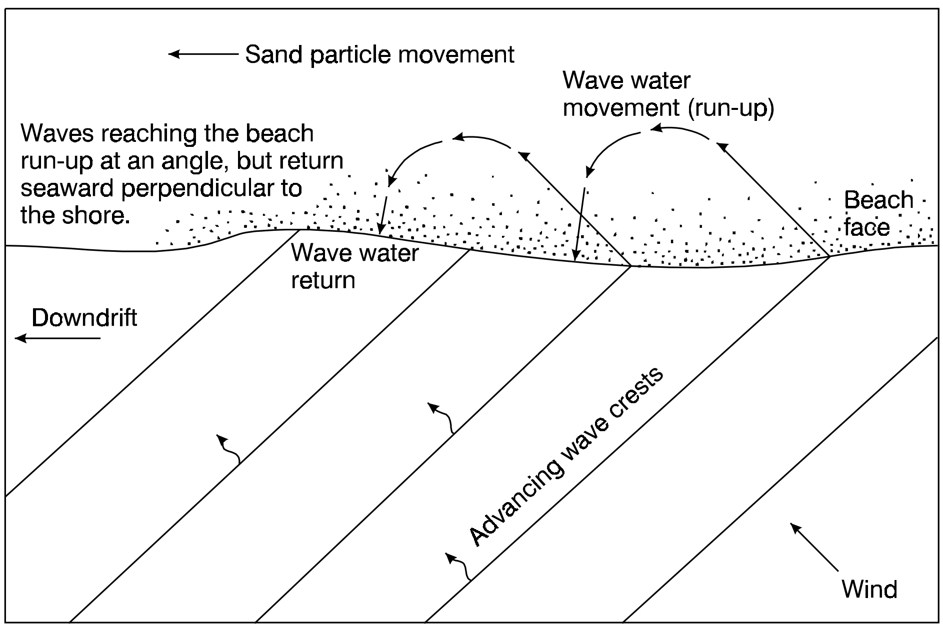
Wondering about Wetlands

William Roberts

Q Literally, what is littoral sand movement?

A Last quarter we discussed the function of groins in the marine environment and stated that their success was "dependent upon a sufficient supply of sand moving in the nearshore littoral system." What exactly is the nearshore littoral system and how does sand move within this system?

Currents and turbulence created by wind-generated waves stir up bottom sediments and transport them parallel to the shoreline. Sand transport usually takes place between the upper limit of wave advance on the beach and offshore depths of up to about 15 meters on ocean coasts. Because large amounts of sand are transported in suspension and relatively little is transported along the bottom, wave height and the degree of turbulence directly impact the amount of sand transported. This process is referred to as *littoral drift.*



Littoral drift also refers to movement of sediments perpendicular to the shoreline, referred to as on-shore and off-shore sand movement, and is a result of waves and currents.

The terms nearshore and littoral are often used interchangeably to describe offshore water currents moving in either direction, but always parallel (alongshore/longshore) to the shoreline. Depending upon the width and depth of the particular body of water under consideration, the term littoral may represent a distance offshore of 25 feet with 3 feet of water as opposed to a distance offshore of 125 feet with 30 feet of water. An ambiguous term, littoral generally refers to an indefinite zone extending seaward from the shoreline to just beyond the breaker zone and is relative to the size of the body of water.

Basically, the longshore transport of sand is accomplished by currents generated when waves strike the shore at an angle. Most wind-generated waves do not approach the beach head-on, but usually at some angle, with a thin sheet of water rising obliquely up the beach face until its energy is dissipated. Any water remaining on the surface of the beach after wave advance stops, returns directly seaward, at right angles to the shoreline. In this manner, the turbulent, incoming wave suspends sediments and transports them onto the beach at an angle. Then, as the water returns seaward, the sediments move back, parallel to the beach, towards the surf where the following incoming waves resuspend them and move them slowly "down the beach."

By moving each grain of sand slowly along the shoreline in small continuous arcs, the alongshore currents are capable of transporting a considerable amount of sediments over time. It is this sand transport which fills the groins constructed along the shoreline, builds sand bars, and contributes to the shrinking or expansion of existing beaches.

Bay Anchovy
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Anchovies are planktivores. They primarily feed on copepods, which are free-swimming crustaceans less than 2 mm in length. When present, other planktonic crustaceans are not passed over. Cannibalism has even been observed for the bay anchovy.

Anchovies have been collected from intertidal marshes, but this is rare. Their contribution to the marine ecosystem is as an abundant food source for many species which depend on wetlands for spawning and nursery areas.

Wetlands Management Symposium

Wetlands Compensation Survey Results

Those of you who attended the Virginia Wetlands Management Symposium in February will remember being the "guinea pigs" for a very informal survey regarding your attitudes toward the functional value and/or utility of wetlands compensation as a management tool. The survey was not in any way intended to be a scientific or statistically valid sampling. Its purpose, that day, was to raise awareness of some of the issues involved, both positive and negative, and to evoke thought among those present as to how some of the specific issues which have evolved with its implementation affect the management value of this aspect of the overall mitigation process. Even though the survey has no scientific validity, the results provide some interesting "food for thought" with regard to opinions of those attending the symposium.

For comparative purposes, results were grouped into local board member/ staff and citizens (local) and state/federal/academic (st./ fed.). Local participants numbered 44 while state/ federal totaled somewhat less at 12. Participants were asked to rate each of the issues on a scale from 1 to 5 with 1 being the lowest and 5 being the highest (see figure). Since none of the rating discriptors fit every issue category precisely, participants were asked to rate some issues as a generic 1 through 5. This, along with a reduced time allocation, may have generated minor confusion at the time but, given the overall objectives of the activity and the results, did not appear to significantly affect the overall outcome.

Wetland Compensation: Its Functional Value as a Management Tool

	n=44 Local	n=12 St./Fed.
Theoretical plausibility	2.8	3.0
Addresses a significant management concern	3.5	3.2
Scientific soundness	2.9	2.4
Implementation	2.4	2.4
Enforcement	2.4	1.5
Measurable benefits	2.8	2.6
Fairness	3.3	3.1
Cost feasibility	2.8	3.0
Meets short-term management goals	3.0	3.2
Meets long-term management goals	2.3	2.0
OVERALL RATING	**2.8**	**2.6**

Ratings: 1=Very poor 2=Poor 3=Fair 4=Good 5=Very Good

Results indicate an overall functional value for compensatory mitigation of fair to poor in the minds of those present, with average numerical ratings by the two groups of 2.8 and 2.6, respectively. It is interesting to note that this overall ranking also held fairly consistently throughout the ten categories which participants were asked to evaluate. The highest rating received by any characteristic was a moderate 3.5 and the lowest was also a not too extreme 1.5 rating. This fact would appear to indicate that although some individuals were highly negative or positive, the two groups in general were decidedly lukewarm about the use of compensation.

The two groups generally did not show a broad divergence of opinion on any of the individual issues evaluated, although the st./fed. group tended to be slightly more negative overall, than the local contingent. The former rated only three of the ten compensation issues higher than their local counterparts.

The two areas of greatest difference of opinion were in "scientific soundness" which the st./fed. group rated 0.5 points lower and "enforcement" which the same group rated almost a full point lower than the local group. Both groups seemed to agree that compensation "addresses a significant management concern" and this issue received the highest overall ranking by the two groups. Also rated higher by the two groups were "meets short term management goals," "cost feasibility" and "fairness." Both groups were in agreement in rating wetland compensation higher in meeting short-term than long-term goals.

The results of the survey can be interpreted to be reflective of the problematic nature of wetlands compensation, and the overall low ratings of the issues considered certainly reflects this. Although rated only fair overall, compensation received its highest ratings for regulatory issues such as meeting management needs, fairness, cost feasibility and meeting short-term management goals. Its lowest ratings occurred in the areas of scientific soundness, enforcement, implementation and measurable benefits.

It would appear that even though there are recognized technical problems and significant questions yet to be answered, compensation has theoretical promise, addresses management needs and at least may meet some short term management goals. This may be an indication of why wetlands compensation has grown significantly in use and popularity with both the management community and the regulated public, even though the scientific community has counciled a decidedly "go slow" approach and still regards many aspects of compensation as more art than science and at best as highly experimental (Kusler & Kentula 1990).

Be that as it may, the rapid rise in utilization and legislative acceptance of wetlands mitigation banking (see article on page 2), which carries compensation a step higher in terms of ecological complexity and policy questions, indicates that management needs and private sector demand may for now be influencing wetland compensation policy to a greater extent than the degree of scientific and technical unknowns involved.

The results of this non-scientific survey among local wetlands managers and primarily state-level professionals, indicate that the local regulators would be slightly more likely to accept compensation than their state-level counterparts, but that overall, compensation is rated fair to poor or slightly less than 3 on a 5 point scale.

Geographic Data Exchange

The State of the Problem, Part 2

Marcia R. Berman

The last edition of *The Virginia Wetlands Report* introduced a problem for discussion which ultimately has widespread impact on researchers, regulators, managers, and private citizens. For many of us, the need for comprehensive, up-to-date data is critical in order to be effective in our roles. We are often expected to address questions in arenas where we might not necessarily have expertise. For example, a planner must address a land use question which requires assessment of a unique tidal marsh. Another example might be the consultant preparing an environmental impact statement for a proposed development project and needs to be aware of the hundred year flood plain boundary and any rare threatened or endangered species in the region. We don't necessarily expect these individuals to research and develop inventories which delineate the boundaries of wetlands, floodplains, or the location of rare species. Rather we accept that they will utilize information the experts provide. This assumes therefore that there is some flow of information among and between disciplines. From the perspective of the GIS manager, we hope information ultimately becomes available for integration into GIS databases since these are exceptional tools for managing resource information and providing a link between disciplines.

Unfortunately all things are not always as we'd like them. True, the use of GIS in all these disciplines is becoming less rare. However, the transfer of information continues to be a deterrent. Why? Several reasons are offered.

From the perspective of the individual who researches, maps, and archives original data, there is the proprietary issue. Until that individual has the opportunity to publish and therefore be professionally credited for the work the data is often not released. This can force others with immediate needs to initiate their own collection program thereby duplicating effort. Academicians are often guilty of this, but, in fact, history suggests that their "intellectual paranoia" might be justified. Note the absence of proper citations on published map information. The next time you read a report which includes a map, review the map carefully. Does it tell you where all the data came from beyond simply the author of the report? If not, can you accept that the author actually surveyed the map lines or points which are illustrated? Probably not.

In a sense, GIS users have perpetuated an obstacle they have been trying to overcome. With the widespread use of GIS, geographically referenced data can be transferred easily between agencies and individuals. Data get imported, manipulated and sometimes altered within other databases. The origin of the data are often lost because users are not diligent about the maintenance of ***metadata***; defined as data about data. This is where information regarding authorship, scale, date of collection, etc., is recorded. To run the risk of losing credit for research, it is not surprising that a scientist might withhold data without first publishing it in some format. In addition to duplication of effort, a secondary consequence is that if and when the data becomes available it might be considerably out-dated so there are fewer applications.

We must realize that when metadata is incomplete or not available, individuals might be forced to duplicate the effort. Without the data's specifications (e.g. date, scale, accuracy and precision) the data could be used improperly. A wetlands regulator may not feel comfortable using a wetland delineation for regulatory purposes if there is no information available on the delineation's accuracy since this application would require very precise deliminators. What if the boundaries of the delineation are actually accurate to only 10 meters (33 feet)? Therefore proper reporting of metadata allows for two things. One, that data can be used with confidence. Two, that data are used appropriately.

The last topic related to data exchange problems in this issue addresses communication of results. It is easy to talk about developing GIS inventories, but perhaps there is a need to inventory the inventories. Is there a good sense in the Commonwealth of Virginia regarding the status of GIS development? There have been investigative reports that document who is using GIS, what level of government they occupy, and their monetary level of commitment to the technology. However, is there a charge to any one agency, authority, or individual to catalogue the various GIS databases or digital coverages which have been generated with public funds? In the absence of such a catalogue can we

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Calendar of Upcoming Events

Oct. 7-8. 1996	**Seventh Annual Virginia GIS Conference. Wintergreen, Virginia. Contact: The Thomas Jefferson Planning District Commission at (804) 979-7310, fax: (804) 979-1597, email: tjpdc@avenue.gen.va.us. Also see: http://www.institute/virginia.edu/vapdc/gis.htm**
June 12, 1996	VIMS Tidal Wetlands Symposium. Registration at 7:30 AM. Watermans Hall, Gloucester Point. Cost 15.00 (includes lunch). Call (804) 642-7395, 642-7380.
July 9-12, 1996	Wetlands '96: Forming Fair and Effective Partnerships. Key Bridge Marriott, Washington, D.C. Assoc. of State Wetlands Managers, P.O. Box 269, Berne, NY 12023-9475. Call (518) 872-1804. Fax (518) 872-2171.
July 16-18, 1996	VIMS Wetland Plant Identification Class. Gloucester Point. Call (804) 642-7395 or 642-7380 for information.
Sept. 17-20, 1996	VIMS Wetland Identification/Delineation Class.Gloucester Point. Call (804) 642-7395 or 642-7380 for information.
Dec. 1-5, 1996	Third Marine and Estuarine Shallow Water Science and Management Conference. Atlantic City, NJ. Contact: Edward Ambrosio at (215) 597-3697 or email at ambrosio.edward@epamail.epa.gov

Geographic Data Exchange
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reasonably expect the exchange of information to be that high? Where does the regulator go to supplement his digital database with an up-to-date shoreline survey? Where does the consultant go to acquire rare species information, wetlands boundaries, and floodplain levels to create environmental impact maps? Today in Virginia there is no central place for these or other entities to go in search of this information. There is no group responsible for keeping up-to-date records of GIS data developed to support Commonwealth initiatives. Should there be?

The last article in this series will expand on this and discuss GIS organization at the state level. Comments and inquiries related to this discussion are encouraged and can be sent to the following:

Marcia Berman
Director - Comprehensive Coastal Inventory Program
Virginia Institute of Marine Science
P.O. Box 1346
Gloucester Point, Virginia 23062
phone: (804) 642-7188
E-mail: marcia@vims.edu