The Virginia Wetlands Report

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Virginia Debates Nontidal Wetlands Regulation

Carl Hershner

Wetland regulation is once again a topic of debate in Virginia's General Assembly. The Commonwealth has been committed to a policy of net resource gain by Governor Gilmore and his predecessors. Achieving this commitment will involve controlling impacts on existing wetlands, as well as creating new wetlands.

There is general agreement that creation of new wetlands to generate a net gain in the resource should be accomplished through voluntary and incentive based programs. The state and the federal government have both initiated a variety of programs designed to promote and encourage wetlands restoration and creation. Collectively these programs are hoped to add thousands of acres of wetlands to the existing resource base.

It is protection of existing wetlands which engenders the most heated debate. At the present time there is no comprehensive inventory of wetlands in the Commonwealth. The National Wetlands Inventory (NWI) program has mapped wetlands in over 90% of the state, and that inventory currently identifies over 1,267,000 acres of vegetated wetlands. These are divided between tidal and nontidal wetlands, with nontidal wetlands accounting for the vast majority – over 1,075,000 acres.

Information derived from NWI maps in Virginia is summarized on the basis of major watersheds in Table 1 (see page 3). When mapping wetlands, NWI uses a classification system which identifies each wetland as one of four types: Estuarine, Lacustrine, Riverine, and Palustrine.

- **Estuarine** wetlands are those associated with tidal waters
- **Lacustrine** wetlands are those associated with lakes, generally in the shallow waters around the periphery.

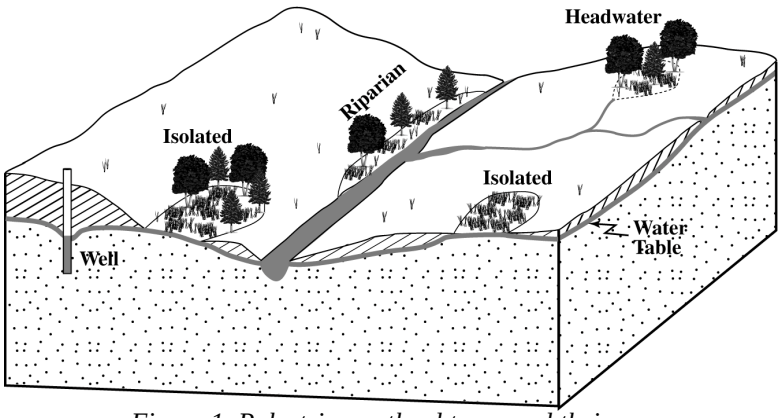

Figure 1. Palustrine wetland types and their relationship to the water table (hydrology).

- **Riverine** wetlands are those found within the banks of rivers and streams.
- **Palustrine** wetlands include all nontidal wetlands on the landscape outside of lakes, rivers and streams. Palustrine wetlands include the riparian wetlands found next to rivers and lakes, and they include the isolated wetlands found away from any surface watercourses (Figure 1).

Virginia already has an excellent regulatory program for tidal wetlands, managed by the Virginia Marine Resources Commission (VMRC), and implemented by VMRC and local governments in the coastal zone. Technical support for this program is provided by the Virginia Institute of Marine Science (VIMS). At present vegetated wetland losses through this program average 10 to 15 acres per year, generally as cumulative impacts from 1000+ permits issued each year.

Virginia does not operate its own nontidal wetlands regulatory program. Instead it exercises regulatory oversight within the purview of the federal Clean Water Act program (using the Virginia Water Protection Permit Program). If the federal program cannot or does not exert jurisdiction over a particular wetland or activity, state oversight is effectively curtailed.

Not all activities impacting nontidal wetlands are covered by federal jurisdiction. Within the past two years, Tulloch ditching of nontidal wetlands in southeastern Virginia has highlighted the limitations of the federal program (for more information on this subject refer to the VIMS Wetlands Program Technical Report 99-4, available on the program's web site at http://www.vims.edu.ccrm/publications.html). The more than 2,600 acres of wetlands impacted by this activity within the past year caused state policy makers to

consider establishing state authority to regulate such impacts.

In Virginia, the debate over state regulation of nontidal wetlands revolves around the question of how comprehensive the regulatory authority needs to be. Basically this becomes a question of how effective the federal program is, and will be, in controlling losses of nontidal wetlands. Opponents of additional state authority argue that there is little need to duplicate federal authority, and only narrow additions to state jurisdiction are necessary to plug gaps in the federal program. Proponents of comprehensive state authority point to other states, such as Maryland, in which the state has assumed the preeminent role in wetlands regulation, and changes or gaps in the federal program are of little consequence to the resource.

Concerns with the federal program's coverage in Virginia are currently focused on four issues: Tulloch ditching; general permits; isolated wetlands; and headwater wetlands. For each of these issues, federal jurisdiction over impacts to wetlands is either already curtailed, under revision, or under challenge.

In the case of Tulloch ditching, the courts have ruled that federal agencies have no, or very limited, authority under the Clean Water Act to regulate the ditching of wetlands for the purpose of draining them. Once wetlands are successfully drained, they may no longer qualify as jurisdictional wetlands, and filling or development can proceed as if the property were an upland site. Potentially, any nontidal wetland which can be practically ditched and drained is at risk from this practice. After a review of National Wetlands Inventory maps for Virginia, it was estimated that there might be as many as 580,000 acres of wetlands with the type of hydrologic conditions amenable to Tulloch ditching.

General permits, also known as nationwide and regional permits, are used by the Corps of Engineers to facilitate regulation of activities having limited and predictable impacts on wetlands. Their purpose is to ease the regulatory burden on property owners by defining activities which may occur without the necessity of obtaining an individual permit. The Corps has been working to revise several of its general permits for the past few years. One of these is nationwide permit 26, which has been controversial because of concerns that it has resulted in extensive cumulative losses of wetlands. Proposed revisions would reduce the potential for unmonitored losses of wetlands, but the changes are heavily criticized by development interests as an unwarranted increase in regulatory burden. The outcome of the rule making process and its impact on federal jurisdiction remains uncertain at this time.

Isolated wetlands are central to the debate about regulation in Virginia because effective federal jurisdiction in these wetlands has also been recently impacted by court decisions. Federal jurisdiction in nontidal wetlands is based, in part, on a concern for protection of the role these systems may play in interstate commerce. This role is easily established in wetlands directly connected to surface waters of the nation, but it is less obvious in isolated systems. The challenge of documenting a reason for federal interest, has had a chilling effect on Corps regulation of activities in isolated nontidal wetlands in Virginia. The debate about the need for comprehensive state authority hinges in part on an assessment of what proportion of the resource is at risk from reduced federal oversight, i.e. "How many isolated wetlands are there in the Commonwealth?" An analysis of current NWI maps for Virginia (not all of the state has been mapped), suggests that there are more than 180,000 acres of isolated nontidal wetlands in the Commonwealth.

Federal jurisdiction in headwater wetlands is at issue in currently pending lawsuits. The question raised, is an extension of the logic used in the isolated wetland issue, " Is there sufficient federal interest in these wetlands to warrant federal jurisdiction?" Headwater wetlands are increasingly appreciated for their importance in maintenance of water quality, and an analysis of NWI maps suggests they may represent a very substantial proportion of all the nontidal wetlands in the Commonwealth.

Decisions about the structure and purview of a state nontidal wetlands regulatory program will depend, in part, on policy makers' sense of the importance of these different types of wetlands. The authority of federal programs to regulate impacts in these systems has been and is being challenged. Legislators must determine if the Commonwealth's commitment to a net resource gain in wetlands will require state authority to protect existing wetlands, as well as the resources and programs necessary to create new ones.

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In this Issue:

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A Crawfish By Any Other Name Would Taste As Sweet

Pam Mason

Your new neighbors have just invited you to a mudbug feast. Do you eagerly count the days until the event, or graciously decline the invitation? If you knew that mudbug was another name for crawfish, would it make a difference in your decision? A traditional element of Cajun cuisine, many people consider crawfish to be quite delicious. While somewhat difficult to find outside of Louisiana and a few other southern states, the demand for crawfish throughout the United States and overseas is an indication of the growing popularity of this delicacy. Market surveys suggest that many markets exist for crawfish that are not being met by the current supply (Masser, Whitis and Crews, 1997).

The natural habitat for crawfish are wetlands, streams, ponds and lakes. Over 300 species of crawfish are found in North America. The two species most widely grown in the United States are the red crawfish, *Procambarus clarkii*, and the white crawfish, *Procambarus blanding acutus*. A third species, the white river or deepwater, crawfish (*Procambarus zonangulus*) will usually become residents of crawfish ponds and is harvested and marketed with the other two species.

The commercial fishery started in the 1940's with the harvest of wild crawfish from Louisiana's Atchafalaya River Basin. Farming took hold as the potential for crawfish production became evident as a result of the large incidental catch from impoundments created for other uses. Today, more crawfish are cultured in the United States than any other crustacean. Louisiana produces around 90 percent of the domestic crop, with an annual yield of 75 to 100 million pounds farmed on 125,000 acres (National Council for Agricultural Education). An additional 25,000 acres are devoted to crawfish production nationwide and are found in the following states: Texas, Florida, South Carolina, Arkansas, Mississippi, Alabama, Georgia, Maryland and North Carolina. Some crawfish are grown in California, Wisconsin, Oregon and Washington.

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Table 1. Vegetated Wetlands in Virginia by Watershed (area in acres)

Watershed	Vegetated Wetland Type					Isolated Wetlands	
	Palustrine	Lacustrine	Riverine	Estuarine	Total Area	Method 1	Method 2
*Lower Pottomac	28,241.1	25.0	259.6	3,959.6	32,485.3	7,920.9	17,158.7
Upper Pottomac	5,025.0	2.9	0.0	0.0	5,027.9	3,194.2	3,545.7
Chesapeake Bay	221,256.5	0.8	0.0	45,912.9	267,170.2	15,930.4	67,284.1
Atlantic Ocean	107,889.6	0.0	0.0	85,736.0	193,625.6	470.7	17,237.2
*Rappahannock R.	33,015.9	11.6	51.7	10,261.5	43,340.7	6,332.6	15,295.5
*York River	99,125.5	42.3	0.0	15,711.0	114,878.8	10,603.6	25,967.5
*Lower James	104,872.1	19.9	68.8	17,491.8	122,452.6	21,830.5	42,185.8
Middle James	33,300.2	0.0	0.0	0.0	33,300.2	9,001.4	14,233.5
Upper James	2,782.2	0.0	0.0	0.0	2,782.2	1,399.7	1,636.8
*Appomattox River	28,180.1	0.0	0.0	0.0	28,180.1	6,525.9	15,972.3
*Chowan River	348,216.4	4.0	0.0	11,923.6	360,144.0	79,371.6	157,948.9
Roanoke River	59,932.3	86.0	0.0	0.0	60,018.3	14,441.2	29,777.0
Ararat River	29.2	0.0	0.0	0.0	29.2	26.1	26.2
New River	1,822.0	0.0	0.0	0.0	1,822.0	1,484.7	1,553.3
Holston River	640.8	0.0	0.0	0.0	640.8	453.2	510.7
Clinch River	1,018.0	0.0	0.0	0.0	1,018.0	786.6	832.6
Big Sandy River	96.5	0.0	0.0	0.0	96.5	76.2	80.4
TOTAL:	1,075,443.4	192.5	380.1	190,996.4	1,267,012.4	179,849.3	411,246.0

* = NWI inventories are still incomplete for these watersheds

Wetland Denizens

Salt Marsh Snails

by Walter I. Priest, III

Editor's Note: *This is the inaugural article for a new column for the new millennium. It will explore the life histories and eccentricities of the many and varied animals indigenous to different types of wetlands. It will not focus on any particular group but endeavor to portray common, frequently encountered animals that have important roles in wetland ecology and also just happen to lead interesting lives.*

The initial subject is one of the unsung heros of wetland energy flow, the salt marsh snail, *Melampus bidentatus* Say. *Melampus* are air breathing marine snails that have evolved into an increasingly terrestrial existence while maintaining their marine heritage.

Melampus are small, up to 13 mm (½"), gastropods with thin dark brown spiral shells that sometimes have lighter bands. Their distribution ranges from southern Canada to the West Indies. They are found in brackish to salt marsh substrates generally above the mean high water line. They live in association with high marsh plant species, e.g. the short form of *Spartina alterniflora*, *S. patens*, *Distichlis spicata* and *Juncus roemerianus*. Being a pulmonate, air-breathing snail, *Melampus* cannot tolerate extended periods of submergence and must climb plant stems to avoid drowning during spring high tides.

Melampus at home in the high marsh.

Despite this, *Melampus* retain their dependence on spring and neap tide flooding for spawning and larval dispersal with their spawning synchronized to this fortnightly cycle. Eggs are laid on the surface of the marsh prior to a spring/neap high tide which covers the eggs with silt and debris, preventing them from drying out. The incubation lasts approximately two weeks with hatching timed to release the free-swimming larvae into the water column during the next spring/neap high tide cycle. The larvae develop in the water column for another two weeks until the next spring/neap high tides can carry them back to the high marsh where settlement occurs.

The snail's food consists primarily of detritus, microbially enriched decaying plant matter from marsh plants. They also consume algae and bacteria found growing on the surface of the marsh. *Malampus* are in turn preyed upon extensively by killifish, clapper rails and black ducks.

It is in its role as a prey item that *Melampus* performs a significant role in the energy flow through a tidal marsh system. It is one of those important organisms that is capable of converting the organic production of the marsh into animal biomass that can be exported from the marsh, via its predators, into the estuarine system as a whole.

Crawfish
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Crawfish production systems can be categorized as natural or artificial systems. Natural systems typically involve using marshes. Hundreds of fishermen harvest crawfish from the natural wetlands in Louisiana. However, impediments to the use of natural wetlands include trees and other obstacles, lack of control over water levels and difficulty in ensuring sufficient forage for the crawfish. Three types of artificial systems are used: impounded wetlands, permanent crawfish ponds and crop rotation ponds. Many farmers grow crawfish in rotation with rice. Not only does the majority of the labor occur during winter months when other farming activities are not as great, but the rice stubble ensures sufficient forage for the crawfish.

Recent attention in aquaculture has focused on negative impacts such as estuarine habitat destruction and aquifer depletion. As a relatively new industry, the long term environmental effects of crawfish farming are yet to be determined. However, the immediate planting of rice minimizes the need for cultivation and herbicides, the available detrital material eliminates the need for formulated feed and the use of both surface water and sub-surface aquifers supplemented by rainfall minimizes the demand on any given water supply. These industry attributes have lead some to conclude that the crawfish industry has many positive aspects of sustainability (Caffey, R., R. Romaire and J. Avault, Jr., 1996).

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GIS Geographic Information System

Computing Isolated Wetlands in the Commonwealth

Marcia Berman and Tamia Rudnicky

The policy issues surrounding nontidal wetlands are discussed in the lead article of this newsletter. When these issues arise, policy makers frequently want to know the extent of the resource under review. Recently, the question was raised, "Just how many acres of isolated, nontidal wetlands are there in Virginia?". Geographic Information Systems (GIS) is perhaps the only tool which can accurately derive the answer in a timely manner.

Using available data sets, a GIS model was designed which would calculate the number of isolated wetlands in the Commonwealth. An isolated wetland is defined as a wetland which has no connection to surface hydrology. The two digital data sets used in this analysis were wetlands data provided by the National Wetlands Inventory Program (NWI), and hydrography data extracted from the U.S. Census Bureau's Tiger Data. Digital NWI data are not complete for Virginia. An estimated 3,240 square miles has not been mapped and/or converted to digital record. This represents less than 7% of the total state. Watershed and county boundary data were also used to determine where these wetland resources may be concentrated in the Commonwealth.

The greatest challenge working with NWI data is the file size. More than 290 megabytes of NWI data are available for the state. These data include over 250,000 polygons (distinct wetland areas) and 58,000 linear wetlands, defined as very narrow wetlands trending along streams. Even on high speed computers, processing time is extensive at every step. In this analysis, linear wetlands are treated as polygons by assuming a width of 5 meters along the stream bed.

The first step in the model was the sorting of all the NWI data for only those classes, subclasses, and modifiers related to vegetated wetlands. This eliminated unvegetated wetlands like open water, or intertidal beaches. The sorted data were then imported into programs written in ArcInfo's Arc Macro Language (aml). The programs specify a set of rules or criteria developed by scientists in the Center for Coastal Resources Management.

Because the exact definition of "isolated wetlands" is still in question, two approaches were taken in our analysis. The first, known as Method 1, is a conservative approach which would classify the fewest number of wetlands as "isolated" based on the strictest definition. Method 1 classifies a polygon or linear wetland as isolated if the wetland is not intersected by hydrology when the NWI and Tiger hydrographic coverages are superimposed. Method 1 excludes wetlands which are contiguous to other wetlands with intersecting hydrology, and do not have hydrologic connectivity themselves. The aml selects those polygons and linear wetlands which meet these criteria and builds a separate coverage. Method 2 is a less conservative approach, which does not consider hydrologic connectivity between wetlands. In Method 2, a wetland is considered isolated if it doesn't have intersecting hydrology, or if it is adjacent to a wetland with intersecting hydrology, but itself does not have hydrologic connection. Again, the aml selects those polygons and linear features to build another layer. Boundary coverages for the watersheds and localities of Virginia are merged with the coverages generated for Method 1 and Method 2 to calculate the acreage of isolated wetlands in each county or watershed, respectively.

This analysis calculated just under 180,000 acres of isolated wetlands using the more conservative rules established for Method 1. By the loosest definition, Method 2, there are more than 400,000 acres of isolated wetlands within the Commonwealth. (See Table 1 on page 3.) The Virginia Institute of Marine Science, Center for Coastal Resources Management Special Report No.00-1 (Hershner et.al., 2000) documents the ramifications of these findings and is available from VIMS upon request.

Reference

Hershner, Carl, Kirk Havens, Lyle Varnell, and Tamia Rudnicky. 2000. *Wetlands in Virginia*. Special Report No. 00-1, Center for Coastal Resources Management, Virginia Institute of Marine Science, College of William and Mary, 12 pp.

Editor's Note:

As this newsletter goes to press, the more comprehensive wetland bill has passed the House on a vote of 80 to18. The Senate has passed a version of both bills with implementation of the more protective bill delayed until 2001. The two houses must now reconcile since the House rejected the bill plugging Tulloch ditching only and put no delay on the comprehensive bill. The governor has been silent on the controversy to this point. Final wrap-up in our summer issue.

Calendar of Upcoming Events

March 24, 2000	**The Status of Virginia Wetlands** Sponsored by the Virginia Association of Wetland Professionals. Randolph Macon College, Kaufman Room. Contact Magi Shapiro; 804-883-6337, to register.
May 16-19	**VIMS Wetland Identification and Delineation Class** Contact Bill Roberts at 804-684-7395 or wlr@vims.edu for details.
July 19	**VIMS Tidal Wetlands Seminar** More information coming in June. Contact Bill Roberts.
August 6-12	**21st Annual Meeting of the Society of Wetland Scientists** Quebec City, Canada. Detailed information is available at http://www.cqvb.qc.ca/wetland2000/

Book Review

For the Health of the Land: Previous Unpublished Essays and Other Writings.
by Aldo Leopold, edited by J. Baird Callicott and Eric T. Freyfolge. Island Press, Washington D.C., 1999. 243 pp., 22.95 (hard cover).

Review by Anne Newsome

To most conservationists, Aldo Leopold needs no introduction. Best known for his book *A Sand County Almanac, and Sketches Here and There*, Leopold sets forth in that work his vision of land conservation. His newest book, *For the Health of the Land: Previous Unpublished Essays and Other Writings*, includes essays, some never published before, which also deal with these same ideas of conservation and "land health." The essays are divided into three parts, which the editors present in chronological order, beginning with Leopold's first essays written in the 1930s and ending with those he wrote in the mid-1940s. The chronology of the book is purposeful; the editors want the reader to see the change in Leopold's philosophy over the decades of his work. His views shift from a strict conservation perspective to one of preservation. And although today's society faces environmental challenges on a global scale not faced during Leopold's life, the ideas that he set forth in these essays are still applicable to today's environmental problems.

Although the editors divide the book into three parts, the common thread that connects all of the essays is Leopold's idea of promoting conservation on privately owned lands. Part I includes essays from his earliest days as an author, and primarily focus on game management by farmers in the Midwest. Once Leopold moved back to the Midwest in the mid 1920's, he noted that many farms were void of much of the game that existed back in the early part of the 1900's. The essays, including "Farm Game Management in Silesia," and "Coon Valley: An Adventure in Cooperative Conservation," allude to Leopold's belief that landowners are the first line of defense for land conservation. The farmers in Silesia (Germany) set up a system of land management, to help protect and promote wild game. The essay on Coon Valley stresses a total commitment to conserving all portions of the land, instead of the fragmented, "band-aid" approach to conservation practiced in the United States in the early part of the 1900's.

Part II will remind readers of the lessons Leopold tried to teach in his earlier book, *A Sand County Almanac*. Each of the forty short essays, many of which were printed in the *Wisconsin Agriculturist and Farmer* between 1938 and 1942, are presented by season. Each article focuses on useful conservation practices landowners could implement on a small scale, with little money and few resources. Leopold knew that although many landowners loved the land, a lack of knowledge would prevent them from taking action to protect wildlife. Thus, his essays range from explaining how to provide food for animals in different seasons of the year to providing or protecting natural areas on their land that would keep or attract wildlife, especially birds.

In the last section of the book, the editors include writings that promote Leopold's ideas of "land health." In the essay entitled, "Planning for Wildlife," Leopold writes of his rationale for preservation of wilderness; that virgin areas could act as a control, such that changes to the land could be measured against them for an estimation of land health. And it is in his essay, "Biotic Land-Use," that Leopold defines land as including soils, water and wildlife and that in order to pursue conservation, one had to understand the interconnections among all parts of the land. This concept, what we now call ecosystem management, was unheard of in Leopold's time, but set him apart from other scientists of his day.

It is these last essays in the book that one finally understands the far-reaching vision that Leopold had for the land. In the end, he believed that preservation would be the key to protecting the land. The sad fact of Leopold's work is that even after more than fifty years, we have yet to learn the lessons that he taught us. As he wrote in 1948, "we abuse land because we regard it as a commodity belonging to us. When we see land as a community to which we belong, we may begin to use it with love and respect." The years have not diminished the power of Leopold's words and his vision for the health of the land.