

## CHAPTER 7.8 WETLANDS ASSESSMENT AND PROGRAM INITIATIVES

### Overview

Generally speaking, wetlands are lands transitioning between terrestrial and deep-water habitats where the water table is usually at or near the land surface or where the land is covered by shallow water (Cowardin *et al.*, 1979). Virginia has many different types of wetlands, including salt marshes, estuarine wetlands along freshwater portions of tidal streams, interdunal swales, pocosins, palustrine wetlands in freshwater floodplains, freshwater swamps, bogs, fens, wet meadows, and isolated wetlands.

Wetlands may be defined in different ways with regard to jurisdictional issues, but all wetlands have in common a seasonal pattern of hydrology or continuous inundation, characteristic hydric soils, and vegetation adapted to growing under saturated condition. For example, the Wetlands Act of 1972 (Title 62.1 of the Code of Virginia) defines tidal wetlands for the purposes of protecting the resource and regulating development. As such, vegetated tidal wetlands are defined in the Act as "all land lying between and contiguous to mean low water and an elevation above mean low water equal to the factor 1.5 times the mean tide range at the site of the proposed project in the county, city or town in question," and on which are growing one or more of 37 specified species of wetlands vegetation. Non-vegetated wetlands are defined as all other lands between mean low water and mean high water. The Act does not include a definition for non-tidal wetlands, nor does it include all lands that are considered to be wetlands under federal law. The definition of wetlands contained in the DEQ's Virginia Water Protection Permit Program Regulation 9VAC25-210-10 *et seq.* parallels the federal definition of wetlands contained in Section 404 of the Clean Water Act: "Wetlands mean those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support and, under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas." Wetlands are part of State Waters per Section 62.1-44.3 of the Code of Virginia. State Waters means "all water, on the surface and under the ground, wholly or partially within or bordering the Commonwealth or within its jurisdiction, including wetlands."

Wetlands occupy approximately four percent of Virginia's land mass (Dahl, 1990). United States Fish and Wildlife Service National Wetlands Inventory mapping and research from state scientists have estimated that vegetated palustrine wetlands cover approximately 1,075,443 acres of Virginia; estuarine wetlands cover approximately 190,996 acres; lacustrine wetlands cover about 193 acres; and riverine wetlands cover about 380 acres (Hershner *et al.*, 2000). Approximately 72 percent of the wetland areas in Virginia, including all the estuarine wetlands and most of the large nontidal palustrine wetlands, are in the Coastal Plain (Tiner and Finn, 1986). Approximately 22 percent of the wetlands in Virginia are in the Piedmont, and the remaining 6 percent are in the Appalachian Plateau (Tiner and Finn, 1986; Harlow and LeCain, 1991). Virginia has worked with local scientists to develop geographic information system-based (GIS) estimates of wetland acreage and wetland type by watershed, which can be used in cumulative wetland impact assessments, as discussed further in the Wetland Monitoring and Assessment section of this report.

Development activities in wetlands in Virginia are regulated by the U.S. Army Corps of Engineers (the Corps) through Section 404 of the Clean Water Act; by the Department of Environmental Quality, through the Virginia Water Protection Permit Program and Section 401 of the Clean Water Act; by the Virginia Marine Resources Commission (VMRC); and by local Wetland Boards through the Virginia Tidal Wetlands Act of 1972. For more information about wetlands, the historical development of the program, applicable laws/regulations, and permitting, see the VWP Permit Program web page at <http://www.deq.virginia.gov/Programs/Water/WetlandsStreams.aspx>.

Virginia has experienced losses of wetlands as a result of human-related development. In the 1780's, wetlands covered about 1,849,000 acres (more than 7 percent) of Virginia (Dahl, 1990). By the mid-1980's, when permits began to be required for most impacts to wetlands, about 1,075,000 wetland acres remained in Virginia – an overall loss of about 42 percent in 200 years (Dahl, 1990).

Agriculture and forestry, industrial and urban development, and recreation have led to the draining, dredging and ditching, filling, diking, and damming of wetlands in Virginia. According to a Chesapeake Bay Foundation fact sheet (2001), Virginia lost more than 770,000 acres of wetlands, for an average annual loss of 3,870 acres, during the 200-year period from the 1780s to the 1980s. From mid-1980 to the late 1990's, 80% of estimated losses of freshwater vegetated wetlands (mostly forested systems) occurred in the Coastal Plain. Wetland trends for the Norfolk/Hampton region of Virginia indicated a loss of about 4,800 acres of vegetated wetlands between 1982 and 1989-90 (Tiner and Foulis, 1994). During 1998 and 1999 alone, more than 2,500 acres of non-tidal wetlands in Virginia were ditched for development. The net loss of wetland areas has slowed since 2000 due to stricter laws, greater enforcement, and new mitigation strategies.

## **Wetland Monitoring and Assessment**

### Background

A key aspect of the Commonwealth of Virginia's nontidal wetlands program is ensuring that there is no net loss of wetland acreage and function through permitted impacts and a net gain in wetland resource through voluntary programs. To accomplish these goals, the Virginia Water Protection (VWP) Permit Program received grants from EPA in August 2003, October 2004, October 2006, October 2007, and October 2008 to determine the status of wetland resources in Virginia, in terms of location, extent, and overall quality of wetlands in each watershed. Using this information, the VWP Permit Program tracks changes in wetland acreage and functions, target certain watersheds, and help determine the effectiveness of compensatory mitigation replacing lost wetland acreage and function. As a first step, Virginia developed a long-term Wetland Monitoring and Assessment Strategy for wetland monitoring and assessment, including the goals and objectives of a monitoring and assessment program and a time frame for implementation. The strategy provides a framework for an ongoing assessment of the status of the Commonwealth's wetland resources and the success of both our wetland regulatory and voluntary programs. The end result of the ten-year strategy is expected to be the incorporation of wetland monitoring and assessment data into the Commonwealth's water quality monitoring programs.

Virginia has narrative water quality standards for all surface waters, including wetlands. The overall water quality for state waters is determined based on whether or not the condition of the waterbody being assessed allows citizens to safely enjoy the six designated uses of the water (aquatic life use, fish consumption use, swimming use, public water supply use, shellfish consumption use, and wildlife use), as described in the Virginia Water Quality Standards (9VAC25-260 et seq). Part of the above-referenced monitoring and assessment strategy includes 1) the evaluation of these designated uses for their applicability to a wetland's condition, and 2) the assessment of whether other designated uses of wetlands may apply. The strategy may also support the agency's goal of developing specific wetland quality standards as narrative use criteria.

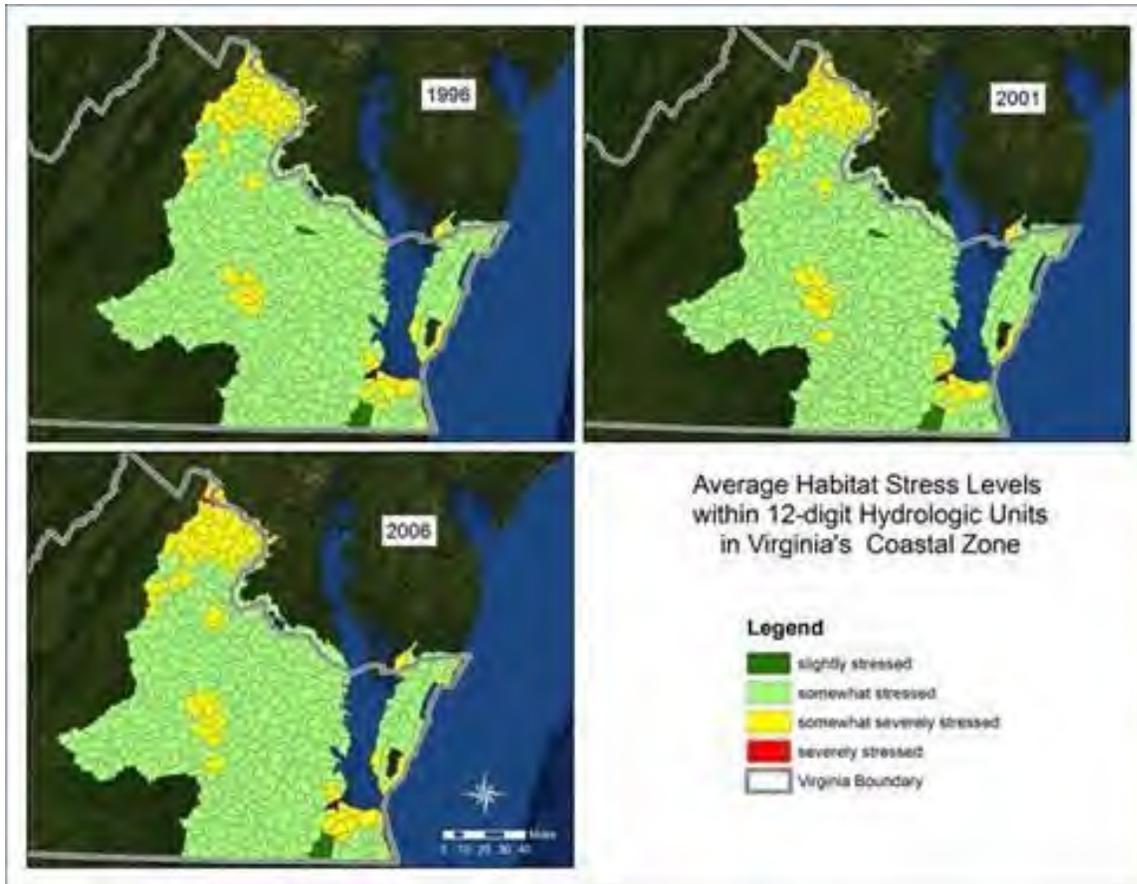
The wetland monitoring and assessment strategy incorporates the EPA March 2003 "Elements of a Wetland Monitoring and Assessment Program Checklist" and the EPA May 2006 "Application of Elements of a State Water Monitoring and Assessment Program for Wetlands" (a supplement to the 2003 EPA document). The strategy uses a three-tiered census approach to wetlands assessment, using a suite of core and supplemental indicators, to assess whether or not a particular wetland is performing at a similar condition as an identified reference wetland. The first tier (Level 1 analysis) consists of a comprehensive coverage of all mapped wetlands using a GIS-based analysis of remotely sensed information. The second tier of assessment (Level 2) is intended for use in a statistically selected sub-sample of the watershed wetland population and involves a more sophisticated analysis of remotely sensed information and a site visit for verification and additional data collection. The third tier assessment (Level 3) is designed to specifically evaluate performance of functions in wetlands under varying degrees of stress, as indicated by the results of Levels I and II.

Since 2003, the overall wetland monitoring and assessment strategy has been to establish baseline conditions in various broad contexts, such as land use, watershed, and wetland type. The elements of the wetland monitoring and assessment program are listed in Table 7.8-1 below.

| <b>Table 7.8-1 Wetland Monitoring and Assessment Program Elements</b> |  |
|---|--|
| Monitoring Strategy   | <ol style="list-style-type: none"> <li>1. Establish baseline condition of nontidal wetlands by broad category scaleable from individual wetland to small watershed to physiographic province to entire State.</li> <li>2. Guide management decisions regarding restoration, compensation, and regulation of wetlands.</li> </ol>   |
| Monitoring Objectives   | <ol style="list-style-type: none"> <li>1. Support regulatory decision-making.</li> <li>2. Report wetland condition.</li> <li>3. Guide policy development.</li> <li>4. Evaluate cumulative impacts of wetland loss.</li> <li>5. Evaluate wetland restoration and compensatory mitigation effectiveness.</li> </ol>  |
| Survey Design   | <p>Three-Tiered: Sample Frame = all NWI wetlands</p> <ol style="list-style-type: none"> <li>1. Enhanced GIS analysis (census) – Level I (Model Development).</li> <li>2. Probability-based sampling for field assessment of anthropogenic stressors – Level II (Model Calibration).</li> <li>3. Intensive study of biological endpoints (birds, amphibians, water quality) along stressor gradient – Level III+ (Model Validation).</li> </ol>   |
| Assessment Indicators and Methods                                     | <ol style="list-style-type: none"> <li>1. Level I (Model Development): land use adjacent, within 200m, and within 1000m of wetland, wetland size, type, hydroperiod, proximity to other wetlands, road type, road density, and road alignment.</li> <li>2. Level II (Model Calibration): field assessment of anthropogenic stressors within 30m of wetland assessment point and within 100m of wetland assessment point.</li> <li>3. Level III (Model Validation): population and community structure metrics for birds and amphibians. Water quality modification metrics.</li> </ol> |
| Quality Assurance   | <p>An EPA-approved Quality Management Plan coupled with the VIMS' Quality Assurance Plan used to prevent random and systematic errors. Techniques include direct electronic field data assimilation to prevent transcription error as well as random return site visits and redundant QA assessment loops.</p>   |

### Example of Results

Wetland condition scores for both habitat and water quality for the coastal plain showed shifts over a 10 year period from 1996 to 2006. Overall wetland habitat considered severely and somewhat severely stressed increased from 18.2% in 1996 to 21.2% in 2006 with a concurrent decrease in wetlands considered somewhat stressed and slightly stressed from 81.6% in 1996 to 78.8% in 2006. Wetlands with water quality condition considered severely and somewhat severely stressed increased from 33.1% in 1996 to 35.3% in 2006 with a concurrent decrease in wetlands considered somewhat stressed and slightly stressed from 66.9% in 1996 to 64.7% in 2006 (Table 8). Condition scores averaged by 12-digit HUC are shown for three years (1996, 2001, 2006) in Figure 7.8-1.



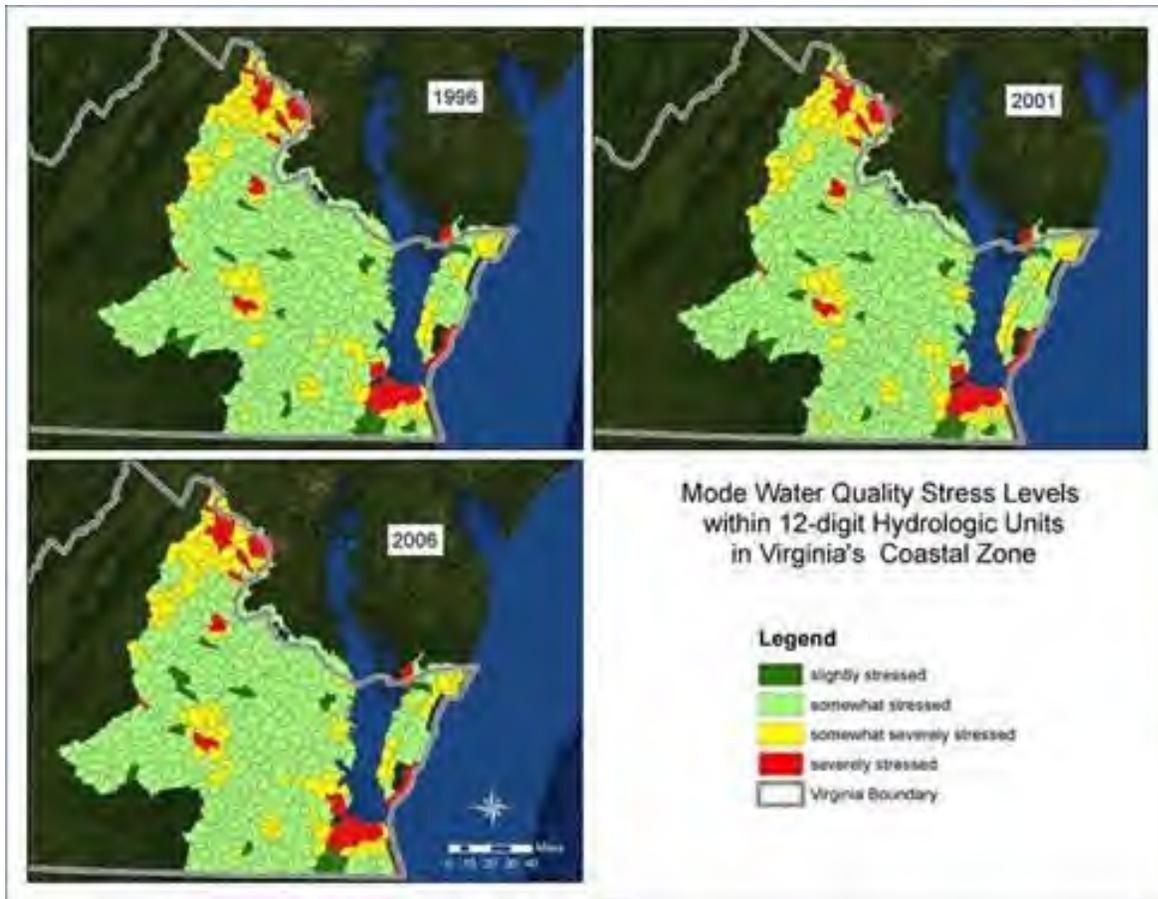


Figure 7.8-2. Wetland condition scores by 12-digit HUC for habitat ecosystem service and water quality ecosystem service in the coastal plain of Virginia for the years 1996, 2001, 2006.

Current initiatives

DEQ's monitoring objectives are designed to support regulatory decision-making, allow reporting of wetland conditions, and provide information for policy development. Products from the wetlands monitoring and assessment strategy directly support Goal 4 of EPA's Strategic Plan to provide "...additional focus on assessment of wetland condition" and the National Priority of "wetlands monitoring and assessment". Table 7.8-2 provides an overview of the strategy's milestones and the status of each.

|         |            |  |          |
|---------|------------|--|----------|
| Phase 1 | Oct. 2003  | Begin Level I assessment for Virginia.   | Complete |
|         | Dec. 2004  | Begin Level II site assessment of Coastal Plain wetlands.  | Complete |
|         | Dec. 2005  | Complete Level I assessment of Virginia, Complete Level II site assessment of Coastal Plain, Develop protocol for Level III assessment for Coastal Plain physiographic province. | Complete |
| Phase 2 | Dec. 2005  | Begin Level II site assessment of Piedmont physiographic province.   | Complete |
|         | Sept. 2007 | Complete Level II site assessment of Piedmont. Begin Level III sampling for coastal plain sites.   | Complete |

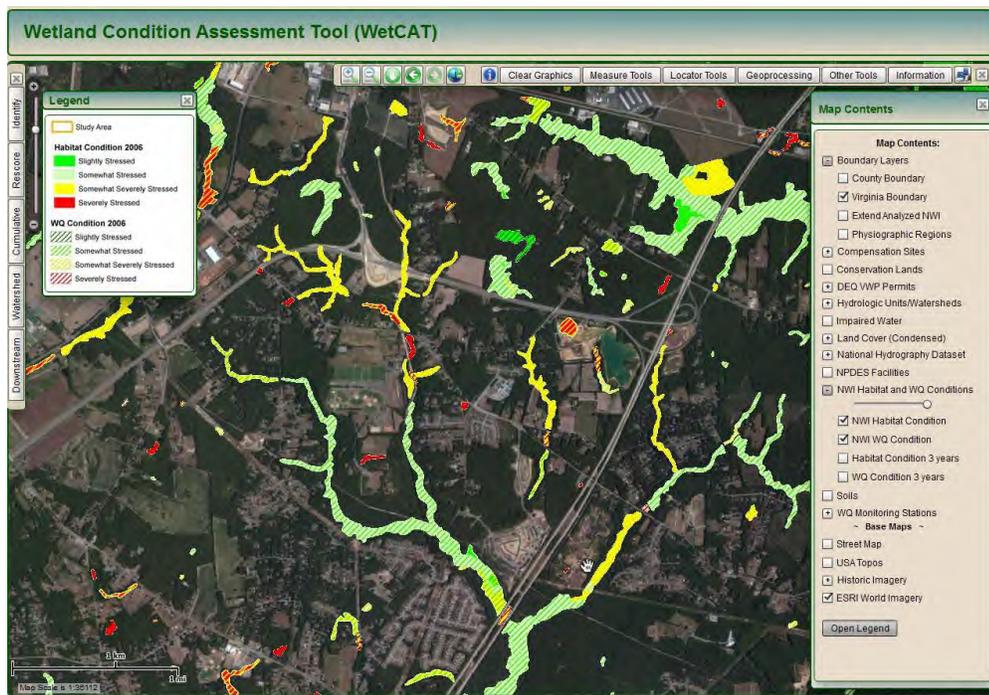
|         |                        |  |          |
|---------|------------------------|--|----------|
| Phase 3 | Oct. 2007 – Sept. 2008 | Complete enhanced wetland site selection for Ridge and Valley Level II site assessment using a protocol for probable wetlands location. Complete Level II site assessment for Ridge and Valley physiographic provinces. Continue Level III sampling for Coastal Plain.   | Complete |
| Phase 4 | Oct. 2008 – Sept 2010  | Begin Level III (model validation) sampling for Piedmont, and Ridge and Valley. Begin Level II re-sample coastal plain subset for calibration.   | Complete |
| Phase 5 | Oct. 2010              | Begin Level I re-sample of Virginia for trends analysis.   | Complete |
| Phase 6 | Oct. 2010              | Development of a Wetland Program Comprehensive Plan, refinement of our environmental database, and continued development of the wetlands monitoring and assessment program.  | Complete |
| Phase 7 | Oct. 2011 – Dec. 2014  | Collaborate with VDOT to incorporate linear transportation projects into the wetland data viewer, potentially review and update the monitoring and assessment strategy to incorporate completed tasks and re-evaluate the direction of the strategy. Continued re-calibration of the assessment model.   | Complete |
| Phase 8 | Oct. 2014              | New data collection equipment have been distributed to DEQ monitoring staff and the training field staff is complete. Development and testing of new protocols for DEQ field staff that provides for integrated data collection and quality assurance in support of the recalibration effort and non-mapped NWI wetland identification is ongoing. Continuing the model recalibration and developing additional datasets for WetCAT. | Ongoing  |

The following summarizes some key results of the strategy effort to date:

- Based on the model validation (Level 3) for the Piedmont and Ridge & Valley physiographic provinces of Virginia, and the re-calibration of the Coastal Plain, the relative stressor frequency has remained similar in the coastal plain between 2004 and 2010 with some slight increases in eroding banks/slopes and sediment deposits/plumes but with a decrease in 2010 of potential non-point discharge toxics/nutrients. Re-calibration of surrounding landcover and stressors shows that the landcover classes remain valid for condition assessment scoring. All landcover types identified in the earlier assessment as having significant relationship to the ecosystem endpoints of habitat and water quality continue to have significant relationships with the identified onsite stressors.
- DEQ and VIMS staff have designed and implemented procedures to facilitate the routine application of inventory and monitoring data in permitting decisions. A web-based delivery of monitoring data and a prototype tool for assessment of wetlands that are not part of the NWI database has been developed. Both of these tools were designed to assist DEQ wetland project managers by providing desktop access to information on wetland resources throughout the Commonwealth. Additional work was needed to improve the user interface such that cumulative impacts may be assessed and compensation opportunities may be identified.
- A pilot study that included input from state and federal personnel on the use of the wetland data viewer was conducted in 2011. We anticipate that these data may be used by local governments (for comprehensive planning process and zoning), regulatory agencies (for cumulative impact analysis), researchers (for developing new studies and research questions), and the general public (for wetland and watershed awareness).

- Virginia continues to develop a baseline data set, documenting current conditions and the general quality of wetlands throughout the state to determine whether existing wetland conditions are affecting wetland functions and values. Using a Geographic Information System (GIS), a baseline map has been developed by overlaying wetlands, as depicted on National Wetland Inventory (NWI) maps and other data sources listed previously, and a wetland quality indicator developed from the use of a stressor checklist tool and wetland landscape position. This information can be reported in the context of wetland types, land use, landscape position, or by watersheds, depending upon the information needed. Preliminary data and mapping has been uploaded to a web-access server, hosted by the Virginia Institute of Marine Science (VIMS), and once made public, these data will allow anyone to search the data base by several parameters (preview in Figure 7.7-3). The data viewer has been refined to include tools for assessing linear projects, and GIS mitigation bank data from the Regulatory In-lieu fee and Bank Information Tracking System (RIBITS) has been incorporated.

**Figure 7.8-3. GIS-based Wetland data viewer**



- Continue development of both a training manual as a reference for users, and a training event that can be self-paced. This information and all other accomplishments completed since 2005 will be incorporated into an updated Monitoring and Assessment Strategy. The project will increase the understanding of a wetland's condition and improve evaluation of environmental impacts to wetlands during permit reviews as part of Virginia's regulatory program.

### Future actions

DEQ is currently conducting orthophotography of the entire Commonwealth of Virginia through funding from NOAA. This data will be imported into WetCAT once completed. As additional data are collected, Virginia will use this sequential survey information to look at changes in wetland quantity and quality over time. This temporal analysis will be accomplished by continuing to refine the wetland database with information on wetland losses and gains in each watershed using the permit tracking database, as well as periodically conducting wetland quality assessments in select watersheds to make inferences on wetland conditions. This in turn will allow for management decisions to be made that could provide additional protections for watersheds experiencing significant declines in wetland quantity and/or quality. For example, monitoring information could be used to identify exceptional value wetlands that should have greater protection within the context of permitting programs and to identify good candidates for targeting wetland restoration projects.

In order to generate the type of site specific guidance and recommendations that DEQ wetland project managers indicate would be most useful, VIMS developed and tested some new analytical protocols modeled on procedures developed by VIMS under previous EPA grants. Future success will be measured by an increasing trend in the statistically-reliable Level I protocol that is used by wetland managers to assess cumulative wetland impacts and wetland and watershed restoration opportunities. By having a statistically-validated tool that measures wetland quality as a function of habitat and water quality parameters, our permit staff will be able to make better permit decisions relative to potential cumulative impacts. Further, we will also be able to measure how well we are protecting the function of our more vulnerable wetlands (i.e. isolated wetlands, vernal pools, white cedar swamps) by comparing the condition of wetland habitat and water quality parameters, as a function of the assessment scoring over time. The overall outcome of this continued focus on wetland monitoring and assessment will be better protection of wetlands and more definitive and defensible information on wetland condition over time, and documentation of how we are achieving no net loss of wetland acreage and function in Virginia.

As State Water Control Law (SWCL) and VWP Permit Program regulations require compensation for unavoidable, permanent impacts to surface waters that are sufficient to achieve no net loss of existing wetland acreage and function and no net loss of function in all surface waters (See, § [62.1-44.15:21](#) and 9VAC25-210-80 (C)), the data collected will also be used in conjunction with other water monitoring data to evaluate the effectiveness of wetland protection programs in terms of meeting the goal of no net loss of wetland acreage and functions. This will be accomplished through Section 305(b) reporting, and will include a determination of whether the wetland regulatory program is attaining this goal. In addition, wetland monitoring information can be used within the context of the following programs to address additional management measures: Section 319 (nonpoint source control), Section 314 (Clean Lakes), Section 303(d) Total Maximum Daily Loads (TMDLs), Section 402 (NPDES permits), and water quality standards modifications.

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