Monitoring Wetland Mitigation Sites in Virginia

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Wetlands Program
Monitoring Wetland Mitigation Sites in Virginia

Introduction

The Monitoring Wetland Mitigation Sites in Virginia project has two main objectives: 1) to develop a database of existing wetland mitigation sites, and 2) to characterize these sites as to their design and their ability to perform the wetland functions of habitat, sediment stabilization and water quality. Underlying objectives of this project included 1) the selection of a database application that can be utilized on the Internet and an evaluation tool for these specific functions, 2) perform the field assessments, and 3) display the data through an interactive web page.

Methods

The wildlife (habitat), sediment stabilization and water quality functional assessments included in Environmental Concern's Evaluation of Planned Wetlands (EPW) were selected as the evaluation criteria for this project. These assessments were chosen because they were designed specifically for the evaluation of created wetlands.

A Microsoft Access relational database was developed to integrate five elements:

1. The 3 assessments: Habitat, Sediment Stabilization and Water Quality,
2. Mitigation site Location, to include city or county and watershed,
3. Mitigation site Design information,
4. Site Universal Transverse Mercator (UTM) coordinates, and
5. Digital Photographs of the sites.

The first three elements required tables to hold the data as well as forms to facilitate data collection. The final two elements required tables to be linked to the other information in the database.

To populate the database, Virginia government offices, the Army Corp of Engineers (COE), and wetland construction contractors were contacted for information they had on constructed mitigation sites. Virginia's Department of Transportation had digital data that could be readily manipulated and incorporated into the Location table of this database. These locations were chosen for pilot sites to test the functionality of the database. The form that was developed to input location information into the table was designed so that upon entry of the city or county, a listing of the 11-digit hydrologic units possible in that area appeared in the watershed field for selection. This would allow the data to be sorted by county, city or watershed. In addition to location information, mitigation site design details were collected from the project files and/or COE Permit Applications.
The design portion of the database is used to record details of the planned mitigation site to include size, community structure, number of strata and similarities to the impacted site.

Following the collection of location and design information, field surveys were required to perform the functional assessments, take a digital photograph of the site and collect UTM coordinates with a Global Positioning System (GPS). To facilitate the data collection, the database was further designed to be compatible with Pendragon Forms software for PALM® organizers. This upgrade allowed these field compatible instruments to be used to record the answers to the assessment questions in the field and then download them directly into the database, eliminating the need for data sheets and subsequent data entry. The forms themselves were created to be as quick and easy to complete as possible. For the most part, the questions consisted of yes/no check boxes or fields where the possible choices were incorporated as a drop down list where only one choice could be selected.

The database and related data were then manipulated with MY Structured Query Language and Hypertext Preprocessor so that the information could be accessed through the Internet. In order to associate the information to the locality of interest, an ESRI ArcView map of Virginia was created labeling the counties and prominent cities. The UTM coordinates of the evaluated sites were processed into a shape file and added to the map so that their locations are visualized (Appendix A).

Results

The results of this project are two fold. First, there is an online database that allows the general public to view the location, design criteria, photograph and wetland functional assessment of the Virginia’s wetland mitigation sites. Second, a series of database queries have been developed to follow EPW’s scoring criteria that result in a score for each of the assessed functions. These scores can be used as a means of ranking the mitigation sites, as compared to each other, by their ability to perform wetland functions.

The online database is located at http://ccrm.vims.edu/mitigation/. This page opens with a map of Virginia, labeled with counties and prominent cities. Bright pink dots indicate the location of mitigation sites that have been evaluated and included in the database. The placement of these markers comes directly from the UTM coordinates collected at the site. A single click on the city or county of interest will bring up a listing of the mitigation sites and a checklist of the information that is available for each site as indicated by the symbol: ✓. The possible information available, as indicated by the column headings, includes Location, Habitat, Sediment Stabilization, Water Quality, Design and Pictures. Clicking on the symbol in a column for the site of interest will bring up the listing for the entire county or city, but the site of interest is highlighted, scrolling may be required to locate the desired row. Using the browser’s “Back” button will take you back to the initial listing where additional information for the first site can be retrieved or a new site can be selected.
As most mitigation sites have not, to date, been associated with GPS points, efforts to populate the database with evaluation data were hindered by the researcher's ability to detect the actual mitigation site upon arrival at the site location. Future coordination with Virginia's Department of Transportation, other state agencies and local governments, will allow for data collection and entry into this database. Additional site evaluations will be accomplished through the use of the Virginia Institute of Marine Science's Center for Coastal Resources Management's Advisory Group in their wetland impact permit review process.

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References

Appendix A