NEW HAMPSHIRE DEPARTMENT OF ENVIRONMENTAL SERVICES
MERRIMACK RIVER WATERSHED WETLANDS RESTORATION STRATEGY

Wetlands are widely known to be effective in protecting water quality, providing wildlife habitat, mitigating floods, and providing many other functions. Although New Hampshire has been relatively successful in protecting wetland resources, many have been degraded by past and current land uses and many more are impacted each year through legally permitted activities. Restoration of these degraded areas therefore, holds great potential to help improve New Hampshire's water quality, wildlife habitat and general quality of life.

Like so many worthwhile efforts, though, funding is limited. The recent development of the Aquatic Resource Mitigation (ARM) Fund has provided a promising new source of funds to help with the effort. However, it is of the utmost importance to properly apply the funding. A thorough and systematic study of restoration opportunities in the basin is the first step in prioritizing public and private expenditures. A clear, science-based understanding of these wetlands will help focus energy on the correct approach for restoration efforts and will ensure that funds are used to maximum efficiency.

To this end, the NH Department of Environmental Services (NHDES) is developing a Merrimack River Watershed Wetlands Restoration Strategy that builds on existing technical information and NHDES' understanding of the basin. Mitigation funds collected in this watershed will be ready to be disbursed in Spring 2009. The goal of the restoration strategy is to identify potential restoration and/or preservation sites for ARM Fund applicants. The information will also be available for other grant application opportunities. Finally, the GIS model will be in a format that allows DES the ability to apply it to successive watersheds prior to them being ready for disbursal.

In January, 2008 EPA provided funds for DES to develop the watershed restoration strategy. The following tasks summarize the work DES and the contract consultant is conducting to carry out the grant and to locate important resource opportunities.

I. SEEK INPUT FROM COMMUNITY & WATERSHED STAKEHOLDERS

- Obtain existing data and publications relevant to the study.
- Review expert knowledge and scientific literature.
- Conduct stakeholder survey in order to develop information on potential priority sites from Merrimack watershed stakeholders including municipal planning departments and conservation commissions, county conservation districts, state, and federal resource agencies; planning commissions, land trusts, and watershed associations.
- Create a simple project website to allow for electronic posting of information throughout the project and will post an electronic version of the survey.
- Conduct two public informational sessions.
- Convene a Technical Advisory Group (TAG) to ensure that all available technical knowledge and resources are applied to the project.

II. COLLECT ALL AVAILABLE DATA AND CREATE A BASE MAP

All available natural resource and land-use information will be assembled to create a working GIS project that will form the basis of the Watershed Wetland Restoration Strategy. The GIS will be developed using ESRI ArcGIS 9.2, and will contain relevant natural resource and infrastructure data

from GRANIT, NHDES, NHFG, NHDRED, SPNHF, and TNC, as well as relevant data provided by other stakeholders.

A combined wetland data layer will be created by dissolving National Wetlands Inventory (NWI) data with poorly and very poorly drained soil units as contained in the Natural Resource Conservation Service's digital soils mapping. This data layer would form the basis of the identification and prioritization of sites. It is recognized that this process will not capture all of the actual jurisdictional wetlands in the watershed, but the identification of additional wetlands is not within the scope of this project. The base map is developed through use of the following information relative to wetlands with a minimum of five acres in size:

1. At least 20% of the wetland system is identified by the National Wetlands Inventory as having one or more of the following Cowardin, et al. (1979) Special Modifiers:

   "d" = partially drained/ditched;
   "h" = diked/impounded; or
   "x" = excavated.

2. Any portion of the wetland intersects an area mapped as "Agricultural" or "Other/Disturbed" land cover classifications using the most recent NH Land Cover Classification coverage (Justice, et al. 2001).

The sites identified will be displayed on topographic maps and distributed to the communities for use in planning efforts and future potential mitigation projects.

III. PRIORITY SITES IDENTIFICATION MODEL

During this task, a GIS-based functional evaluation model will be developed to rank every wetland system identified during the Site Identification Model. The objective of the model is to identify the best sites for wetland restoration based on the potential to restore or protect functional values. The available GIS-based resource layers will then be related to the functions and values as described in the *Method for the Comparative Evaluation of Nontidal Wetlands in New Hampshire* (Figure 1).

The model will use resource data layers such as aquifers, floodplains, and conservation lands, etc., and analyze their spatial relationship to the wetland systems. The spatial relationships among the datasets will be the major components used to build the GIS model in ArcGIS 9.2 Model Builder. The basic model concept is that, through a series of spatial and mathematical operations using the GIS variables, each wetland system will receive a score, or ranking, for each Function/Value. It is expected that the score will be ordinal, where a system with the lowest score for any given function will be less likely to perform that function, while a high score indicates a greater potential to perform that function (Figure 2). In summary, the model measures three major components:

- **"Net Functional Benefit"** – a measure of the potential increase in wetland functions and values that could be achieved by restoration of the candidate site;
- **"Sustainability"** – a measure of whether the restoration of the site would persist over time or whether it would be compromised by encroaching development; and
- **"Landscape Position"** – a measure of whether the site is in a location that lends itself to restoration.

Figure1. Site Prioritization Model: Functional Evaluation Component

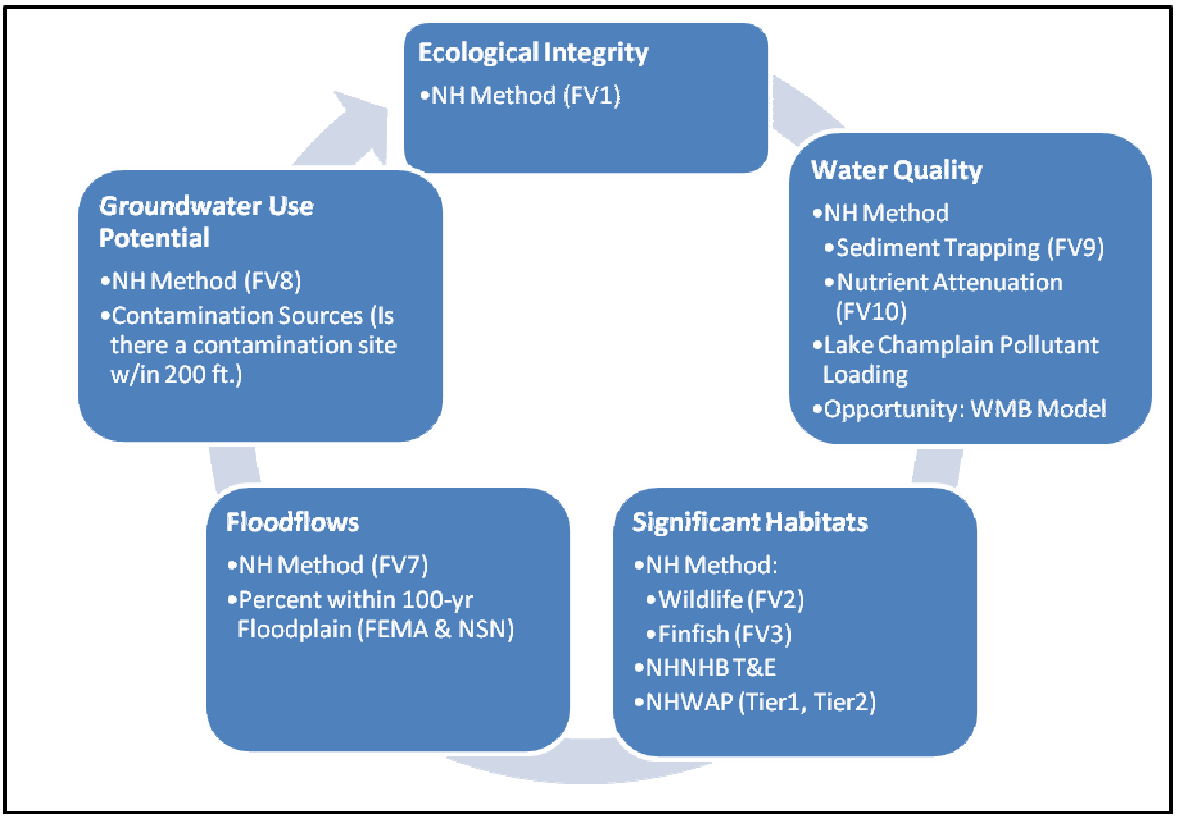
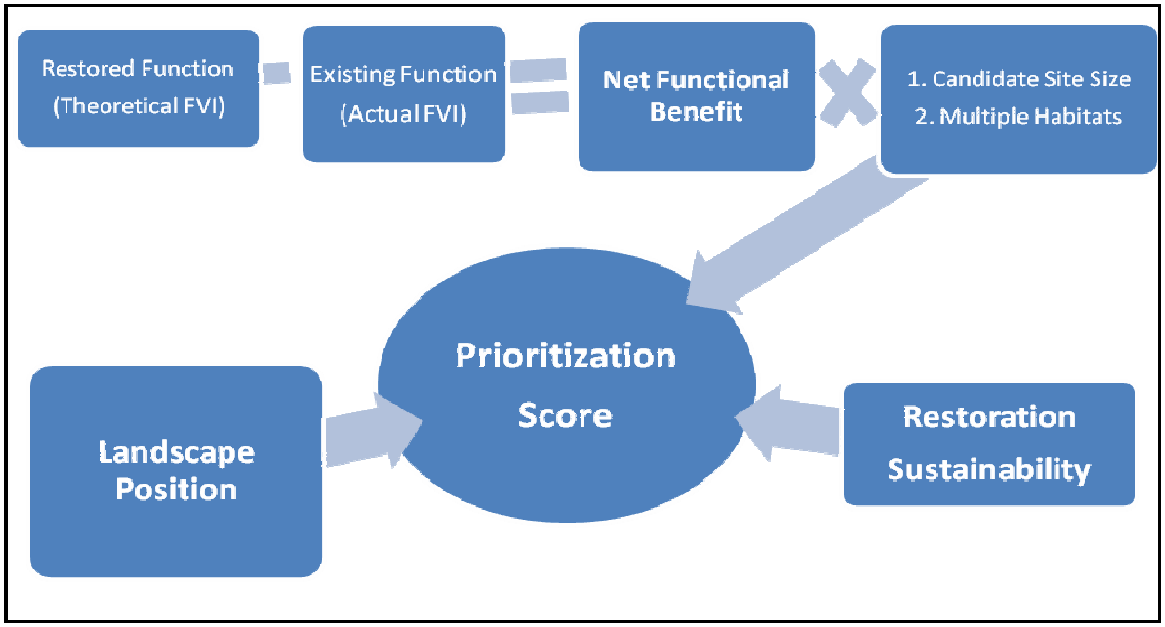


Figure 2. Site Prioritization Model



IV. DEVELOP GIS-BASED MAPS OF PRIORITY AREAS

Following the Site Identification and Prioritization, NHDES will convene the TAG and choose 40 sites to review in the field. Sites will be distributed throughout the watershed, and will be selected based on the potential of the site to:

- Restore aquatic habitat and potential storage functions of streams, riparian continuity, or areas affected by historic filling, draining or ditching;
- Restore and protect wildlife corridors and other key links to high-value habitat
- Reduce sediment loading and other pollutants from surface runoff by increasing soil retention, filtration, and nutrient uptake functions of wetland and riparian systems;
- Restore and protect habitat to promote species richness and diversity; and
- Restore and protect headwater wetlands and streams.

Based on data gathered during the field portion of the project, a simple plan of each site will be developed that shows the existing conditions and the potential restoration measures that could be implemented. We expect that the plan will typically consist of two (2) 11 by 17 inch full color maps of the site. The first map would represent the existing conditions and would identify impairments. The second map would depict potential restoration measures, including target cover types and habitat features.

V. FINAL REPORT, PUBLIC OUTREACH FUTURE IMPLEMENTATION

A technical report will be completed to summarize the study. The report will include the following elements:

- A description of the study methodology, including the GIS model components;
- A summary of the results of each step of the Site ID Model and the Site Prioritization Model;
- Descriptions of each of the 30 wetland restoration sites, focusing on the biological and geological setting of the site;
- Conceptual restoration plans for each of the 30 sites;
- A brief summary of recommendations; and
- The GIS model language/scripts that can be run on other HUC8 watersheds.