USDA FOREST SERVICE
SOUTHERN RESEARCH STATION

INTERIM REPORT:
ASSESSING WETLAND RESTORATION AND CREATION PRACTICES IMPLEMENTED UNDER U. S. DEPARTMENT OF AGRICULTURE CONSERVATION PROGRAMS IN THE SOUTHEASTERN COASTAL PLAIN

Progress Report to:

USDA Natural Resources Conservation Service CEAP–Wetlands

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BACKGROUND

Wetlands provide significant ecosystem services that include floodwater storage, water-quality improvement, and wildlife habitat. Under U.S. Farm Bill programs, an array of defined conservation practices may be installed to reduce agricultural impacts on environmental quality, with some practices aimed specifically at protecting or restoring the ecological functions of wetlands. As part of the NRCS Conservation Effects Assessment Project, Wetlands National Component (CEAP–Wetlands), regional studies are being conducted to assess the ecological benefits of such wetland practices on agricultural lands (see Duriancik et al. 2008). Although the Southeastern U. S. is a region of diverse wetlands, a forthcoming CEAP–Wetlands review (De Steven & Lowrance, *in press*) found that information on the nature and outcomes of wetland conservation practices is scarce to non-existent in the region. The specific practices of wetland restoration and creation were relatively infrequent and largely unstudied, with little indication of what wetland types were restored or how the practices were implemented. Wetland hydrogeomorphic (HGM) types will differ in the potential ecosystem services they provide; thus, without knowledge of wetland type, ability to assess gains in ecological services is hindered.

In the Southeast, approximately 60% of land cover is forested and agriculture comprises only about 20% of land use (USDA 2006), but both forestry and agricultural activities have been significant regional causes of wetland degradation and loss (e.g. Hefner & Brown 1985, Hefner et al. 1994). There is a critical need to document the wetland types, landscape settings, and success of wetland restoration practices in order to assess ecological benefits and improve practice implementation. The regional review (De Steven and Lowrance, *in press*) indicated that reported wetland restoration/creation practices implemented under Farm Bill programs in the Southeast were confined largely to four states (NC, SC, GA, MS), with over 60% of practices implemented in South Carolina alone. The present study was designed to evaluate wetland restoration and creation projects in three states (SC, GA, MS) spanning the Southern Coastal Plain. Questions to be addressed include: 1) what wetland types were restored, and by what practices and methods?, 2) were wetlands restored in original geomorphic settings, or were atypical wetland classes created?, and 3) do restored sites show indicators of improved wetland condition? This progress report summarizes initial findings for wetland restoration projects in South Carolina.

METHODS

The NRCS National Conservation Planning Database was queried for records of the wetland restoration and creation practices (#657 and #658, respectively) reported as implemented during the period of 2000–2008 on privately-owned Farm Bill program lands. For South Carolina there were 158 practice records, of which nearly all (95%) were wetland restoration (#657) and nearly all (92%) had been applied under the Wetland Reserve Program (WRP). Conservation projects linked to the records were identified, plus some additional WRP projects with missed records. A "project" represents a defined wetland or tract with coordinated planning that may involve multiple landowners, contracts, or data records. The end result was a South Carolina sample of approximately 76 wetland restoration projects distributed among 85 WRP contracts, plus 9 miscellaneous projects under other programs (Conservation Technical Assistance, Conservation Reserve, and Wildlife Habitat Incentives Programs). The 85 contracts represent ca. 42% of all South Carolina WRP contracts completed or in progress since the program's inception (1995) to mid-2009. The smaller number of practice records for Georgia and Mississippi (approximately 50) is not yet analyzed.

This report is a preliminary assessment of the South Carolina WRP projects, which represent the predominant and typical applications of the wetland restoration practice (#657). The WRP easements were enrolled during 1996–2004, with project completion dates from 1998–2008. Project locations span all South Carolina physiographic sub-regions (Piedmont, Hilly Coastal Plain, Coastal Flats). Written conservation plans, site aerial photography, USGS topographic maps, and NRCS soil survey maps were reviewed for each project to compile information including project topographic setting, land/habitat status prior to applying the wetland restoration practice, other conservation practices associated with the project plan, and the hydrogeomorphic classes of the project wetlands. To date, evaluations have been completed for 67 projects, with the others nearing completion. Findings should be regarded as tentative until data for all study projects have been compiled and analyzed.

PRELIMINARY RESULTS

Of the 76 WRP projects, over half were in the Hilly Coastal Plain (54%), followed by 34% in the Coastal Flats and 12% in the Piedmont. Most projects (93%) were in 30-year or permanent easements, with only 7% in 10-year cost-share agreements. Prior land status and wetland types reflect both the general character of the Southeast as a largely forested region, and also a distinctive feature of South Carolina's Wetland Reserve Program. By 2003, the SC NRCS State Office established a WRP special-projects initiative to enroll degraded sites with hydric and/or "problem" soils (i.e., lacking some hydric indicators) that under undisturbed conditions would be subject to frequent flooding and would support hydrophytic vegetation. Typically, such areas are identified as degraded floodplains along major rivers where natural water flows and movements of aquatic biota have been blocked or disrupted.

Prior Land Status and Wetland Types

Roughly 43% of projects either were ditched prior-converted wetlands used for agricultural cropping or grazing, or were ditched depressions and Carolina bays that appeared more naturally vegetated, possibly having been abandoned from earlier agricultural use. The other 57% of projects were represented by natural bottomland forest sites, many of which had been disturbed by previous timber harvest activities. The forestry sites typically had degraded hydrologic functions and altered vegetation owing to logging-road and culvert construction, clear-cutting or selective timber removal, soil rutting, and debris disposal. Many impacted bottomland sites were being used for hunting and wildlife management as well as for forestry.

Reflecting the special-projects initiative, approximately 54% of degraded wetlands were riverine, including narrow headwater floodplains on low-order streams, wider mainstem river floodplains, and a few tidal rivers near the Atlantic Coast. Riverine wetlands in the Piedmont often had been disturbed by adjacent cropping or pasturing, whereas elsewhere the impacts were more likely to be from timber extraction and/or stream channelization. Some tidal river sites had remnant dikes associated with historical rice production. Depressional wetlands and large Carolina bays represented 29% of projects, and the remaining 17% were wetlands on less well defined flats. Depressions and flats typically were degraded by ditching and/or tile drainage.

Restoration Practices

WRP projects are aimed at restoring or enhancing wetland functions, but also reflect a programmatic emphasis on wildlife benefits and the landowners' interests. Nearly 60% of project files indicated an explicit or implicit goal of managing the restored wetlands as waterfowl habitat; it is likely that the actual percentage is higher. Three projects were of conservation interest because of association with endangered, threatened or sensitive wildlife species (wood stork, bald eagle).

The wetland restoration practice (#657) served two purposes. It was used to report total project area enrolled in the WRP easement, including allowable area for upland buffer habitat. It was also used for specific hydrology restoration techniques, principally installing ditch plugs or removing tile drains. Other restoration practices commonly used with the wetland restoration practice are summarized in Table 1.

Table 1. Principal NRCS conservation practices on WRP wetland restoration projects in South Carolina.

Practices (NRCS practice number)	**% of projects using the practices†**
Wetland wildlife habitat management (644)	84
Water-control structure (587)	61
Earthen dike (356)	60
Upland wildlife habitat management (645)	57
Use exclusion/access control (472)	52
Ditch plug or drain tile removal (657)	30
Microtopography enhancement (see text)	28
Road/dike breach, rock-fill or stream crossing (see text)	27
Tree/shrub planting (612)	25
Shallow-water management for wildlife (646)	12

† based on 67 projects with completed assessments

Restoration methods are adapted to wetland type and setting. On mainstem river floodplain sites (30% of projects), WRP easements must be permanent, and restoration is directed at recovering hydrologic functions and biotic connectivity across the floodplain and to the river.

This is done by breaching roads or dikes and by installing rock-fill road crossings or stream-crossing structures to allow freer water flows and passage of aquatic species; various NRCS practices (#500–obstruction removal, #561–heavy-use area protection, #728–stream crossing, #395–stream habitat improvement, #396–fish passage) may be used to report these actions. Rarely, a small waterfowl pond with a dike and water-control structure may be maintained on a floodplain, but typically this is remnant from earlier land use. Restoring the floodplain forest is accomplished by natural regeneration.

A somewhat different suite of practices is used for headwater-river, depressional, and wet-flat restorations. Ditching and drainage are blocked, usually with a water-control structure and an associated small earthen dike (ca. 70% of sites). This allows for maintaining a base hydrology but also for water-level manipulation to support habitat management for waterfowl or other waterbirds (practices #644, 646). Only 12% of wetlands were restored by plugging ditches or removing tile drains alone (without added water-control). In addition to blocking prior drainage, approximately 40% of projects involved constructing larger impoundments with long earthen dikes; this was a common practice along low-order rivers in the Piedmont.

Enhancement of small-scale topography by creating swales, ridges, or potholes within restored wetlands was done on about 28% of all projects; these techniques were reported either as wetland enhancement (practice #659) or under other practices (#657, 644, 646). Passive revegetation is the usual method for restoring wetland vegetation; although 25% of all projects involved tree planting (practice #612), most of these (16%) were for planting adjacent uplands or wetland borders rather than the wetland interior. About half of all projects included the “use exclusion” practice, which specifies preventing livestock access and prohibits high-impact vehicular access such as all-terrain vehicles.

Project area also varied with wetland type and setting. Average easement size for mainstem river floodplain sites was nearly 800 acres (range 65–2700), whereas the average size of other project types was about 140 acres (range 5–1100). WRP projects can include some upland area adjacent to the restored wetlands. Excluding large-river floodplains with complex topography, about 60% of restored wetlands had minimal adjacent upland buffer within the WRP easement, although buffer habitat may occur adjacent to the easement boundaries. When upland area is

present, the upland habitat management practice (#645) may be applied on small areas; this typically consists of planted food plots for wildlife.

Ongoing Work

Ecological monitoring can determine whether restoration has achieved successful outcomes. In 2010, a selected subsample of the South Carolina projects will be evaluated in the field for wetland condition in terms of vegetation composition and hydrologic status. Further work will complete the project analyses for wetland restorations in the Georgia and Mississippi Coastal Plain and will evaluate field conditions in those restored sites as well. All finding will be summarized into a comprehensive assessment of the practices and ecological implications of restoration projects across the region.

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LITERATURE CITED

De Steven, D. & R. Lowrance 20__. Agricultural conservation practices and wetland ecosystem services in a wetland-rich landscape: the Piedmont–Coastal Plain region. *Ecological Applications* Special Issue (*in press*).

Duriancik, L.F., D. Bucks, J.P. Dobrowolski, T. Drewes, S.D. Eckles, L. Jolley, R.L. Kellogg, D. Lund, J.R. Makuch, M.P. O'Neill, C.A. Rewa, M.R. Walbridge, R. Parry, and M.A. Weltz. 2008. The first five years of the Conservation Effects Assessment Project. Journal of Soil and Water Conservation 63(6):185A-197A.

Hefner, J. M., and J. D. Brown. 1985. Wetland trends in the southeastern United States. Wetlands 4:1-11.

Hefner, J. M., B. O. Wilen, T. E. Dahl, and W. E. Frayer. 1994. Southeast wetlands: status and trends, mid-1970s to mid-1980s. U. S. Department of Interior, Fish and Wildlife Service, Atlanta, Georgia.

USDA [U.S. Department of Agriculture]. 2006. Agricultural Statistics. U.S. Department of Agriculture, National Agricultural Statistics Service, Washington, D.C., USA.