United States Department of Agriculture

Natural Resources Conservation Service
Conservation Effects Assessment Project
Key Findings of CEAP–Wetlands Component

Effects of USDA Wetland Conservation Programs in the Mississippi Alluvial Valley Region

Wetland functions (i.e. pollutant mitigation, carbon sequestration, and support of habitat biodiversity) recover upon wetland restoration, however, better management of water control structures and increased planting of diverse tree species will likely improve MAV wildlife habitat quality.

The Mississippi Alluvial Valley (MAV), the Nation's largest floodplain, was once a predominantly forested ecosystem that provided significant habitat for a diverse flora and fauna, sequestered carbon in trees and soil, and stored floodwater, sediments, and nutrients within the floodplain. This landscape has been substantially altered by the conversion of nearly 75% of the riparian forests, predominantly to agricultural cropland, with significant loss and degradation of important ecosystem services. Landscape-scale efforts have been employed to restore the forest and wetland resources. The USDA Wetland Reserve Program (WRP) and Conservation Reserve Program (CRP) represent some of the most extensive restoration programs in the MAV. The objective of the WRP is to restore and protect the functions and values of wetlands in agricultural landscapes with an emphasis on habitat for migratory birds and wetland-dependent wildlife, protection and improvement of water quality, flood attenuation, ground water recharge, protection of native flora and fauna, and educational and scientific scholarship.

The degree to which WRP conservation practices can restore ecosystem functions and services is not well known. This project was initiated to quantify existing ecological services derived from USDA conservation practices in the MAV as part of the USDA Conservation Effects Assessment Project, Wetlands National Component (CEAP-Wetlands). The USGS, in collaboration with the USDA NRCS and FSA, the USFWS, and Ducks Unlimited, collected data on soils, vegetation, nitrogen cycling, migratory birds, and amphibians from 88 different sites between 2006 and 2008. Results from restored WRP sites were compared to baseline data from active agricultural cropland (AG) to evaluate changes in ecosystem services

Wetland Conservation and WRP in the Mississippi Alluvial Valley Region

- Forested wetland types in the MAV vary from depressional, riverine, fringe or flats. Landscape scale hydrologic modifications ranged from river channelization to artificial drainage to flood control levees.
- The USDA WRP and CRP represent some of the most extensive restoration programs in the MAV. Over 690,000 acres (26%) of the 2,651,728 acres total U.S. WRP lands enrolled by 2013 were located in Louisiana, Mississippi, and Arkansas.
- MAV wetlands provide critical ecosystem services, including the provision of freshwater, regulation of pollutants (e.g., nutrients, pesticides) and hydrological flows, as well as support for biotic communities, which in turn enhance the provision of multiple natural resources benefits.
- Regional wetland conservation practices include wetland restoration (657), wetland wildlife habitat management (644), and riparian forest buffer (391).

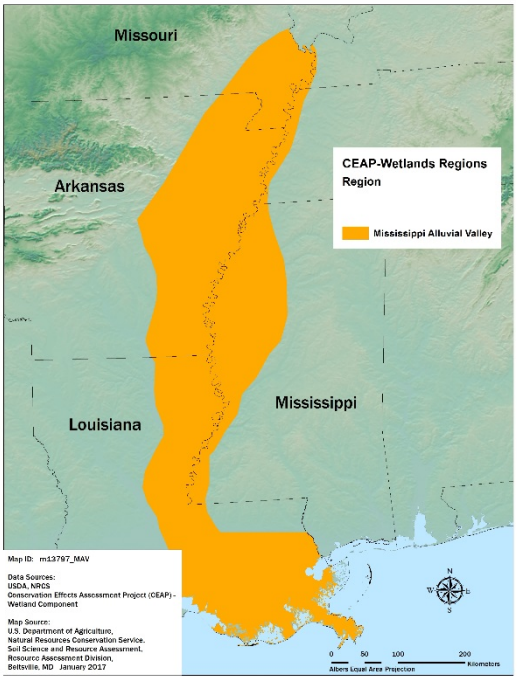

Figure 1. MAV CEAP-Wetland study region

Wetland Restoration Effects on Carbon Sequestration, Denitrification Potential, and Sediment Reduction

- There were no significant differences between the AG and WRP sites in total carbon or denitrification potential likely due to the young age of the WRP sites. The greatest amount of total site carbon is found in tree biomass and the trees planted on the WRP sites are all less than 15 years old.
- Reduction in soil erosion was the most immediately measurable impact of converting AG to WRP. The reduction varied by soil textural class and ranged from 5.10 metric tons/ha/yr for silty clay soils to 9.35 metric tons/ha/yr for silt loam soils.
- If the WRP sites continue on a trajectory towards fully functional BLH sites, then these conservation practices will significantly improve water quality and carbon storage on the MAV landscape.

Wetland Restoration Effects on Biological Conservation, Sustainability, and Habitat Quality

- Restoration practices included planting a narrow range of tree species on WRP resulting in greater species diversity in older, naturally regenerated forests (BLH) and a dominance of oak (Quercus) species on WRP sites. In WRPs, dominant species were Nuttall oak (Q. texana), green ash (Fraxinus pennsylvanica), water oak (Q. nigra), and willow oak (Q. phellos).
- Dominant trees in BLH were sweetgum (Liquidambar styraciflua), hackberry (Celtis laevigata), American elm (Ulmus americana), green ash, cedar elm (U. crassifolia), water hickory (Carya aquatica), and willow oak.
- The high density of oaks and the near absence of other important species suggest that the mature forests resulting from these planting practices will have a different species composition compared with the existing naturally regenerated forests.
- There were improvements in wildlife habitat resulting from conservation practices on the WRP sites with significantly more migratory bird species, but not resident species, compared with AG sites. Overall, 109 bird species were detected in AR and LA and 82 species in MS. Mean observed species richness varied over time by state and habitat type.
- Throughout the study period, BLH sites had greater mean species richness than WRP sites and AG fields. The differences between WRP sites and AG fields changed over the migration season. In LA and AR, the mean species richness of AG sites was significantly greater than WRP sites during early migration; however, as the season progressed, the species richness of WRP sites increased and was significantly greater than AG sites during mid to late migration.
- Increasing the diversity of species planted, while remaining cognizant of species-site requirements, will likely improve the habitat for both resident and migratory birds.

Effects of Wetland Restoration on Potential Wildlife Habitat

- The MAV High Frequency Flood Model indicated that 70% to 78% of sampled easements in LA, AR, and MS were within the 0-24 month flood frequency class.
- The restoration of hydrologic conditions more typical of riparian forested wetlands resulted in higher probability of occurrences of frog species that require permanent water sources (e.g., American Bullfrog, Southern Leopard Frog) and more waterfowl habitat.
- More rigorous implementation and intensive management of water control structures could potentially increase an important measure of waterfowl habitat, Duck Energy Days, by up to 60%.