

## Mississippi Alluvial Valley Wetlands General Information

### 912. **Afforestation of bottomland hardwoods in the Lower Mississippi Alluvial Valley: Status and trends.**

Schoenholtz, S. H.; James, J. P.; Kaminski, R. M.; Leopold, B. D.; and Ezell, A. W.

*Wetlands* 21(4): 602-613. (2001)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

*Descriptors:* afforestation/ lowlands/ forests/ Mississippi/ trends/ wetland restoration

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### 913. **Bottomland Hardwoods of the Mississippi Alluvial Valley: Characteristics and Management of Natural Function, Structure, and Composition.**

Hamel, Paul B. and Foti, Thomas L.

Asheville, NC: U.S. Department of Agriculture, Forest Service, Southern Research Station; GTR-SRS-042, 2001. 109 p.

NAL Call #: aSD143 .G46 no. 42

<http://www.srs.fs.usda.gov/pubs/2474>

*Descriptors:* bottomland hardwoods/ forest history/ mammals/ Mississippi Alluvial Valley/ old growth/ songbirds/ wetland restoration

*Abstract:* A symposium entitled "Bottomland hardwoods of the Mississippi Alluvial Valley: characteristics and management of natural function, structure, and composition" convened on October 28, 1995, as part of the Natural Areas Conference, October 25-28, 1995, in Fayetteville, AR. The symposium's goal was to provide information that managers need to begin restoring the composition, structure, and function of off rest ecosystems in the Mississippi Alluvial Valley. Included in the proceedings from that symposium are 8 of 13 presentations. These peer-reviewed contributions address historical conditions of forests in the Mississippi Alluvial Valley (two papers), historical changes that are reflected in today's forests (one paper), the effect of historic and prehistoric rainfall patterns (one paper), forest fauna in the region (two papers), the effect of herbivory on forest vegetation (one paper), and management of bottomland hardwood forests for multiple outputs (one paper). A ninth paper, concerning characteristics of old-growth forests, is a posthumous submission authored by Dr. James T. Tanner; and the tenth paper was published in another venue. The intended audience of these proceedings includes managers of private, State, and Federal lands, as well as land management planners from a range of jurisdictions.

### 914. **A cumulative impact management plan for a forested wetland watershed in the Mississippi River floodplain.**

Shaffer, G. P.; Burdick, D. M.; Gosselink, J. G.; and Lee, L. C.

*Wetlands Ecology and Management* 1(4): 199-210. (1992)

NAL Call #: QH541.5.M3 W472; ISSN: 0923-4861

*Descriptors:* wetlands/ forest watersheds/ management planning/ degradation/ environmental quality/ forest industry/ environment management/ environmental impact/ USA, Louisiana, Tensas Basin/ forest industry/ environment management/ environmental impact/ forest watersheds/ management planning/ environmental quality

*Abstract:* A management plan using a watershed-scale

approach was devised to limit loss of wetland functions in the one million ha Tensas Basin, Louisiana, U.S.A. Proposals to develop wetland areas are evaluated for their potential to affect the structure and function of the landscape as a whole. The plan required two prior steps. First, we assessed the structural and functional status of the landscape through time. Second, using the assessment, we formulated a set of environmental goals. The assessment indicated that the landscape is severely degraded; of the original forest, 85% has been lost, and the deforestation has negatively affected water quality and biota. Specific goals were devised to conserve remaining wetland resources and to restore functional integrity to the basin as a whole. On the basis of these two prior steps and principles of landscape ecology and conservation biology, we devised a plan that would establish two large tracts of bottomland forest (BLF) totaling 102000 and 63000 ha. These tracts would be established by reforesting about 1000 ha of corridors, primarily along streams, linking existing forest patches. In addition, set-back levees and man-made diversions would be incorporated to restore natural flooding to certain areas of remaining BLF. Existing wetlands would be prioritized on the basis of size and density of patches and placed in one of three management categories. Implementation of such a plan is possible under the present regulatory authority of U.S. federal government programs administered by regulatory agencies responsible for wetland protection (DBO).

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### 915. **A density-dependent matrix model for bottomland hardwood stands in the Lower Mississippi Alluvial Valley.**

Zhao, Dehai; Borders, Bruce; and Wilson, Mabelle

*Ecological Modelling* 184(2-4): 381-395. (2005)

NAL Call #: QH541.15.M3E25; ISSN: 0304-3800

*Descriptors:* density dependent matrix model: mathematical and computer techniques/ wildlife habitat/ biodiversity/ timber production/ Lower Mississippi Alluvial Valley/ water quality protection

*Abstract:* Bottomland hardwoods in the Lower Mississippi Alluvial Valley (LMAV) have become one of the most endangered ecosystems in the United States. This ecosystem is an important ecological resource providing many functions and values such as wildlife habitat, water quality protection, biodiversity, and timber production. Active management and restoration of bottomland hardwoods stress the need for tools to support decision-making, but no reliable quantitative information, such as developed growth and yield models, is available for such forests with high species diversity. A density-dependent matrix model, which recognizes differences in tree species and size, was developed for these bottomland mixed-species hardwoods in LMAV. The model was calibrated using data from continuous forest inventory plots. Trees were placed in one of 13 diameter classes of soft hardwoods or hard hardwoods, or four diameter classes of non-commercial species. Five-year predictions show good agreement between the actual and predicted diameter distributions. In terms of value of stand basal area, the model predicted well for stands with densities ranging from

13.8 to 41.3 m(2)/ha (60-180 ft(2)/acre). The model will be useful for short-term inventory projections and simulation studies of the development of these stands using different management regimes. (c) 2004 Elsevier B.V. All rights reserved.

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**916. Development and application of the wetlands dynamic water budget model.**

Walton, Raymond; Chapman, Raymond S.; and Davis, Jack E.

*Wetlands* 16(3): 347-357. (1996)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

*Descriptors:* ecology: environmental sciences/ forestry/ freshwater ecology: ecology, environmental sciences/ mathematical biology: computational biology/ models and simulations: computational biology/ black swamp/ bottomland hardwood forest/ Cache River/ canopy interception/ computer models and simulations/ evapotranspiration/ flooding/ forested wetlands/ freshwater ecology/ groundwater ecology/ infiltration/ precipitation/ wetlands dynamic water budget model

*Abstract:* A Wetlands Dynamic Water Budget Model was developed and applied to support a large field investigation of processes in the Black Swamp wetlands of the Cache River between Patterson and Cotton Plant, Arkansas. The model is called the Wetlands Dynamic Water Budget Model because it provides magnitudes for the water budget components, as well as water depths, discharges, and flow velocities throughout the modeled system. The development of the computer program is based on concepts and approaches of a number of programs in common use. It includes three dynamically-linked modules that include all the major components of a typical water budget, including precipitation, canopy interception, overland flow, channel flow, infiltration, evapotranspiration, and horizontal ground-water flow. The surface-water module of the model was applied to the Cache River in Arkansas, and augmented a comprehensive hydrologic field study by filling data gaps that occurred due to gage problems and by providing long-term simulation data for broad areas of the wetland, particularly those far away from any measurement station. The results demonstrated that these wetlands are inundated primarily from the backwater produced at downstream constrictions, rather than from the forward-moving flood wave.

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**917. The effects of varied hydraulic and nutrient loading rates on water quality and hydrologic distributions in a natural forested treatment wetland.**

Blahnik, Theodore and Day, John

*Wetlands* 20(1): 48-61. (2000)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

*Descriptors:* freshwater ecology: ecology, environmental sciences/ waste management: sanitation/ forested waste water treatment wetland/ hydraulic loading/ hydrology/ nutrient loading/ water quality

*Abstract:* Hydrology and water quality distributions in a Louisiana forested waste-water treatment wetland were studied under four different hydraulic loading rates (HLR). Pond discharge, surface-water elevations, and fluorescent dye travel times were recorded to assess surface-water hydrology, and water samples were collected for nitrate, ammonium, phosphate, and suspended solids analyses.

Wetted surface area increased with pond discharge rate, and 58 to 66 percent of surface-water flow was concentrated in shallow channels covering only 10 to 12 percent of the total study area. Water residence times were much longer (0.9 to 1.1 days) than minimum dye travel times (2 to 3 hours) through the 4-hectare study area. Relative to study area influent concentrations, study area outflow concentrations of nitrate and total and organic suspended solids were lower, ammonium was higher, and phosphate was generally unchanged. However, there was an increase in concentrations of nitrate, ammonium, and phosphate within 50 m of the study area inflow location. Ammonium and phosphate did decrease from these peak concentrations. Net nitrate production was observed within 50 m of the pond outfall and was probably due to nitrification. Net nitrate removal was observed beyond this distance and ranged up to 0.10 g cntdot m-2 cntdot d-1 probably due primarily to denitrification. In general, nitrate removal rates increased linearly with changes in nitrate loading rates. Results show that nutrient distributions are linked to hydrology. Higher pond discharge rates created more treatment surface area, and higher constituent loading rates produced higher removal rates. Therefore, discharge rates could be manipulated, and physical control structures could be installed to increase wetted surface area and increase removal efficiency within the wetland. Higher loading rates could then be processed without requiring significant increases in treatment area.

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**918. Hydrologic, vegetation, and substrate characteristics of floating marshes in sediment-rich wetlands of the Mississippi River delta plain, Louisiana, USA.**

Sasser, C. E.; Gosselink, J. G.; Swenson, E. M.; and Evers, D. E.

*Wetlands Ecology and Management* 3(3): 171-187. (1995)

NAL Call #: QH541.5.M3 W472; ISSN: 0923-4861

*Descriptors:* wetlands/ hydrology/ vegetation/ marshes/ sediments/ deltas/ environmental effects/ degradation/ aquatic plants/ vegetation cover/ ecosystem disturbance/ USA, Louisiana, Terrebonne Basin/ vegetation cover/ ecosystem disturbance/ vegetation

*Abstract:* Floating marshes occur over 70% of the western Terrebonne Basin, Louisiana, USA, freshwater coastal wetlands. They are of several types: A free-floating thick-mat (45-60 cm) marsh dominated by *Panicum hemitomon* and *Sagittaria lancifolia*; a thick mat marsh dominated by *Panicum hemitomon* and *Sagittaria lancifolia* that floats part of the year, but whose vertical floating range is damped compared to adjacent water; and an irregularly-floating thin mat (<30 cm) dominated by *Eleocharis* spp. in the spring and *Ludwigia leptocarpa* and *Bidens laevis* in the summer and fall. Floating mats must be almost entirely organic in order to be buoyant enough to float. The western Terrebonne wetlands receive large winter/spring supplies of suspended sediments from the Atchafalaya River. Even though sediment concentrations in the adjacent bayou are as high as 100 mg l super(-1), the *Panicum hemitomon*/*Sagittaria lancifolia* free-floating marsh probably receives no over-surface sediments since it floats continuously. The bulk density data of the damped-floating marsh, however, suggest some mineral sediment input, probably during winter when this marsh is submerged. These two types of floating marsh could not have

developed in the present sediment regime of the Atchafalaya River, but as long as they remain floating can continue to exist. Thin floating mats are found in areas receiving the least sediment (<20 mg l super(-1) suspended sediment concentration in adjacent bayous). This low sediment environment probably made possible their formation within the past 20 years. They may represent a transitional stage in mat succession from (1) existing thick-mat floating marsh to a degrading floating marsh, or (2) a floating marsh developing in shallow open water.  
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**919. Hydrology of the black swamp wetlands on the Cache River, Arkansas.**

Walton, Raymond; Davis, Jack E.; Martin, Thomas H.; and Chapman, Raymond S.

*Wetlands* 16(3): 279-287. (1996)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

*Descriptors:* climatology: environmental sciences/ freshwater ecology: ecology, environmental sciences/ black swamp/ bottomland hardwood forest/ Cache River/ flood storage/ forested wetlands/ freshwater ecology/ hydrology/ hydroperiod/ river discharge/ water budget

*Abstract:* The hydrologic characteristics of the Cache River wetlands between Patterson and Cotton Plant, Arkansas, were investigated. The Cache River is an underfit stream with wetlands predominantly located in abandoned channels and backswamps. Much of the Cache River upstream of the study area has undergone extensive channelization to allow agricultural development in the basin. Hydrologic measurements included streamflow gages at the upstream and downstream limits of the study area, water-level recorders inside the study area, a nest of deep and shallow ground-water wells that monitored variations in the underlying aquifer, a meteorological recording station that collected precipitation, air temperature, and solar radiation data inside the study area, and regional precipitation data. Analysis of the wetland's water budget showed that the system is dominated by river discharges and that the magnitudes of other water-budget components are less than the error associated with well-maintained streamflow gages (5-10%). The system is characterized by floods occurring from late fall to late winter and again in mid-to-late spring. Peak flood discharges are approximately 185 ml/s for a 2-year event and 270 ml/s for a 5-year event. Peak discharges between the upstream and downstream gages are reduced by 10-20% with greater attenuation occurring when the system is initially drier. Peak discharge at the downstream gage lags the peak at the upstream gage by 4-8 days depending on antecedent conditions. The majority of overbank flooding is produced by backwater from several constrictions in the downstream reach of the study area, rather than from the forward movement of the flood wave. Floodpeak attenuation between the upstream and downstream gages is due mainly to floodplain storage, with flow resistance contributing minimally. Finally, the relationship between the hydroperiods at different water-surface elevation gages was examined to determine if a long-term record could be used to estimate long-term hydroperiods at interior gage locations (or perhaps at interior computer model locations) with shorter-term information.

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**920. Inorganic nitrogen processing and assimilation in a forested wetland.**

Lindau, C. W.; Delaune, R. D.; and Pardue, J. H.

*Hydrobiologia* 277(3): 171-178. (1994)

NAL Call #: 410 H992; ISSN: 0018-8158

*Descriptors:* ammonium/ bottomland hardwood forest/ denitrification/ direct measurement technique/ Mississippi Valley/ nitrate/ nitrogen assimilation/ soil/ swamp

*Abstract:* A field study was conducted to assess the capacity of a lower Mississippi Valley, USA forested wetland to process and assimilate inorganic N. Elevated levels of N-15 labeled N-4 + and NO-3 --N were added to field plots and emissions of 15N-2 and N-2O and NH-4 + and NO-3 --N concentrations in the floodwater were measured over a 67 d study period. Results are given which show the forested wetland soil can remove significant quantities of NH-4 + and NO-3 - from the surface water by assimilation and denitrification processes.

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**921. Limnology of a wetland complex in the Mississippi Alluvial Valley of southeast Missouri.**

Wylie, G. D. and Jones, J. R.

*Archiv fuer Hydrobiologie* 74 Suppl(3): 288-314. (Dec. 1986); ISSN: 0081-0001

*Descriptors:* wetlands/ reservoirs/ forests/ flooding/ missouri/ limnology/ cycling nutrients/ seasonal variation/ biomass/ limiting nutrients/ macrophytes/ phytoplankton/ aquatic plants/ aquatic habitats/ zooplankton/ salinity/ litter/ leachate/ duckweed/ lakes

*Abstract:* Productive wetlands in southeast Missouri, characterized by low salinity, were studied from 1981-1983. Nutrient chemistry was related to water level management of individual sites. A permanently flooded reservoir had the lowest nutrient concentrations, periodically drained marsh sites contained moderate nutrient levels, and autumnally-flooded forest sites had the highest nutrient concentrations derived from leachate of leaf litter. Nutrient concentrations in the forested sites reached maximum values within a few months after inundation and decreased thereafter. Algal biomass was typically nitrogen-limited in the sites, but high macrophyte production in the largest sites did not depend on nutrients in the water. In addition, rates of community metabolism were related to relative dominance of phytoplankton, rooted macrophytes or duckweeds in the respective sites rather than to nutrient content of the water. Zooplankton concentrations in managed forested sites increased and decreased over time patterns similar to changes in nutrient concentrations, which, together with results from other investigations, suggests that detritivore production in temporarily flooded forest is initially high and subsequently decreases with duration of flooding. (Author's abstract)

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**922. Loss of bottomland hardwood forests and forested wetlands in the Cache River basin, Arkansas.**

Kress, Margaret R.; Graves, Mark R.; and Bourne, Scott G.

*Wetlands* 16(3): 258-263. (1996)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

*Descriptors:* conservation/ forestry/ freshwater ecology: ecology, environmental sciences/ black swamp/ bottomland hardwood forest/ Cache River/ conservation/ forest cover loss/ forested wetlands/ geographic information system/ image processing/ remote sensing

**Abstract:** Data related to forest cover in the Cache River Basin, Arkansas, USA were collected and analyzed to quantify changes in forest cover since 1935. Forest cover loss during the period 1935 to 1987 was characterized using data derived from aerial photography, historical map products, and Landsat satellite multispectral imagery. Forest cover in the basin declined from 65% to 15% over the 52-year period (a loss of 108,000 ha of forest cover). There was little change in forest cover between 1975 and 1987. Remaining forest stands in the basin are fragmented and small in size. Comparing forest-stand data with Soil Conservation Service data revealed that 90% of the forest loss in the southern half of the basin occurred in hydric soil areas, thus indicating a significant loss of forested wetlands.

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**923. Marsh vegetation types of the Mississippi River deltaic plain.**

Visser, J. M.; Sasser, C. E.; Chabreck, R. H.; and Linscombe, R. G.

*Estuaries* 21(4B): 818-828. (1998)

NAL Call #: GC96.E79; ISSN: 0160-8347

**Descriptors:** wetlands/ vegetation/ deltas/ coastal marshes/ sampling/ salt marshes/ vegetation cover/ indicator species/ ecological zonation/ USA, Mississippi R. Delta/ community composition

**Abstract:** Marshes of the Mississippi River Deltaic Plain represent 17% of the coastal marshes in the continental United States. However, only a few detailed descriptions of the diverse plant communities that occur in this large expanse of wetlands exist and none are based on detailed vegetation analysis. The objective of this study was to quantitatively analyze the vegetation data collected in the wetlands of the Barataria and Terrebonne estuary to determine naturally occurring vegetation associations. Two-way indicator species analyses (TWINSPAN) revealed nine vegetation types: polyhaline mangrove, polyhaline oystergrass, mesohaline mix, mesohaline wiregrass, oligohaline wiregrass, oligohaline mix, fresh bulltongue, fresh maidencane, and fresh cutgrass. These nine types form a logical expansion on the four salinity zones described for the region by previous studies and form a basis to compare the vegetation types of the Mississippi River Delta region with other regions of the Atlantic and Gulf coasts.

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**924. Methane flux from Mississippi River deltaic plain wetlands.**

Alford, Douglas P.; Delaune, Ronald D.; and Lindau, Charles W.

*Biogeochemistry* 37(3): 227-236. (1997)

NAL Call #: QH345 .B564; ISSN: 0168-2563

**Descriptors:** atmospheric methane source/ bulltongue/ climatology/ deltaic plain wetlands/ methane flux/ Mississippi river delta/ pollution/ seasonal variation/ soil temperature/ water tupelo

**Abstract:** Methane emissions from three wetland habitats in the Mississippi River deltaic plain were measured over a three year period. Flux data collected indicate that each habitat was a net source of methane to the atmosphere throughout the year. Average emission from a *Taxodium distichum*/*Nyssa aquatica* (bald cypress/water tupelo) swamp forest was 146 +- 199 mg CH<sub>4</sub> m<sup>-2</sup>d<sup>-1</sup> while

emissions from a *Sagittaria lancifolia* (bulltongue) freshwater marsh averaged 251 +- 188 mg CH<sub>4</sub> m<sup>-2</sup>d<sup>-1</sup>. Methane flux from a *Spartina patens*/*Sagittaria lancifolia* intermediate marsh was significantly higher, 912 +- 923 mg CH<sub>4</sub> m<sup>-2</sup>d<sup>-1</sup>. Seasonal variation was significant with emissions being higher in the late summer and early fall. Significant diurnal emissions were observed from the *Sagittaria lancifolia* marsh site. Soil temperature (5 and 10 cm depths) was found to be significantly con-elated with methane emission from the three sites.

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**925. Mississippi River Delta: An overview.**

Coleman, J. M.; Roberts, H. H.; and Stone, G. W.

*Journal of Coastal Research* 14(3): 698-716. (1998);

ISSN: 0749-0208

**Descriptors:** wetlands/ fluvial morphology/ deltas/ deltaic deposits/ coastal morphology/ deltaic features/ USA, Mississippi R./ USA, Louisiana/ reviews/ economic aspects/ social aspects/ subsidence/ water level fluctuations/ saline water intrusion/ population dynamics/ sea level

**Abstract:** Over the last century, the river-dominated Mississippi delta has received increasing attention from geoscientists, biologists, engineers, and environmental planners because of the importance of the river and its deltaic environments to the economic well-being of the state of Louisiana and the nation. Population growth, subsurface resource extraction, and increased land-water use have placed demands on the delta's natural geologic, biologic, and chemical systems, therefore modifying the time and spatial scales of natural processes within the delta and its lower alluvial valley. As a result, the combined effects of natural and human-induced processes, such as subsidence, eustatic sea level rise, salt water intrusion, and wetland loss, have produced a dynamically changing landscape and socioeconomic framework for this complex delta.

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**926. Nest survival of forest birds in the Mississippi Alluvial Valley.**

Twedt, D. J.; Wilson, R. R.; Henne-Kerr, J. L.; and Hamilton, R. B.

*Journal of Wildlife Management* 65(3): 450-460. (2001)

NAL Call #: 410 J827; ISSN: 0022-541X

**Descriptors:** nests/ survival/ riparian environments/ forests/ breeding success/ wildlife management/ ecological effects/ birds/ nesting/ riparian land/ Aves/ USA/ birds/ USA, Mississippi Alluvial Valley

**Abstract:** In the Mississippi Alluvial Valley, flood control has led to a drastic reduction in the area of forest habitat and altered the patchwork of forest cover types. Silvicultural management of the remaining fragmented forests has changed to reflect the altered hydrology of the forests, current economic conditions of the area, and demand for forest products. Because forest type and silvicultural management impact forest birds, differences in avian productivity within these forests directly impact bird conservation. To assist in conservation planning, we evaluated daily nest survival, nest predation rates, and brood parasitism rates of forest birds in relation to different forest cover types and silvicultural management strategies within this floodplain. Within bottomland hardwood forests, nest success of blue-gray gnatcatcher (*Poliophtila caerulea*, 13%), eastern towhee (*Pipilo erythrophthalmus*, 28%),

indigo bunting (*Passerina cyanea*, 18%), northern cardinal (*Cardinalis cardinalis*, 22%), and yellow-billed cuckoo (*Coccyzus americanus*, 18%) did not differ from that within intensively managed cottonwood plantations. However, average daily survival of 542 open-cup nests of 19 bird species in bottomland hardwoods (0.9516 plus or minus 0.0028, similar to 27% nest success) was greater than that of 543 nests of 18 species in cottonwood plantations (0.9298 plus or minus 0.0035, similar to 15% nest success). Differences in daily nest survival rates likely resulted from a combination of differences in the predator community - particularly fire ants (*Solenopsis invicta*) - and a marked difference in species composition of birds breeding within these 2 forest types. At least 39% of nests in bottomland hardwood forests and 65% of nests in cottonwood plantations were depredated. Rates of parasitism by brown-headed cowbirds (*Molothrus ater*) were greater in managed cottonwoods (24%) than in bottomland hardwoods (9%). Nest success in planted cottonwood plantations for 18 species combined (similar to 14%), and for yellow-breasted chat (*Icteria virens*, 7%), eastern towhee (14%), indigo bunting (14%), and northern cardinal (17%) did not differ from nest success in cottonwood plantations that were coppiced from root sprouts following pulpwood harvest. Within bottomland hardwood forests, uneven-aged group-selection timber harvest reduced the combined daily nest survival of all species from 0.958 to 0.938, which reduced nest success by about 14%. Specifically, timber harvest reduced nest success of species that nest in the forest midstory and canopy, such as Acadian flycatcher (*Empidonax virens*) - from 32% before harvest to 14% after harvest. Conversely, those species that nest primarily in the shrubby understory - such as northern cardinal - were not affected by timber harvest and maintained an overall nest success of about 33%. Thus, birds nesting in the understory of bottomland hardwood forests are not adversely impacted by selective timber harvest, but there is a short-term reduction in nest success for birds that nest in the canopy and midstory.

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#### 927. **Pattern and process of land loss in the Mississippi Delta: A spatial and temporal analysis of wetland habitat change.**

Day, J. W.; Shaffer, G. P.; Britsch, L. D.; Reed, D. J.; Hawes, S. R.; and Cahoon, D.

*Estuaries* 23(4): 425-438. (2000)

NAL Call #: GC96.E79; ISSN: 0160-8347

**Descriptors:** wetlands/ deltas/ habitats/ dredging/ land management/ canals/ sediments/ rivers/ environmental degradation/ coastal environments/ salt marshes/ degradation/ man-induced effects/ coastal engineering/ navigational channels/ coastal zone management/ environment management/ habitat/ dredging operations/ land/ sediment/ streams (in natural channels)/ USA, Louisiana, Mississippi Delta

**Abstract:** An earlier investigation concluded that most of the coastal wetland loss in Louisiana was caused by the effects of canal dredging, that loss was near zero in the absence of canals, and that land loss had decreased to near zero by the late 1990s. This analysis was based on a 15-min quadrangle (approximately 68,000 ha) scale that is too large to isolate processes responsible for small-scale wetland loss and too small to capture those responsible for large-scale loss. We conducted a further evaluation of the

relationship between direct loss due to canal dredging and all other loss from 1933-1990 using a spatial scale of 4,100 ha that accurately captures local land-loss processes. Regressions of other wetland loss on canal area (i.e., direct loss) for the Birdfoot, Terrebonne, and Calcasieu basins were not significant. Positive relationships were found for the Breton ( $r_{\text{super}(2)} = 0.675$ ), Barataria ( $r_{\text{super}(2)} = 0.47$ ), and Mermentau ( $r_{\text{super}(2)} = 0.35$ ) basins, indicating that the extent of canals is significantly related to wetland loss in these basins. A significant negative relationship ( $r_{\text{super}(2)} = 0.36$ ) was found for the Atchafalaya coastal basin which had statistically lower loss rates than the other basins as a whole. The Atchafalaya area receives direct inflow of about one third of the Mississippi discharge. When the data were combined for all basins, 9.2% of the variation in other wetland loss was attributable to canals. All significant regressions intercepted the y-axis at positive loss values indicating that some loss occurred in the absence of canals. Wetland loss did not differ significantly from the coast inland or between marsh type. We agree with Turner that canals are an important agent in causing wetland loss in coastal Louisiana, but strongly disagree that they are responsible for the vast majority of this loss. We conclude that wetland loss in the Mississippi delta is an ongoing complex process involving several interacting factors and that efforts to create and restore Louisiana's coastal wetlands must emphasize riverine inputs of freshwater and sediments.

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#### 928. **A review of ecological impacts of oil and gas development on coastal ecosystems in the Mississippi Delta.**

Ko, J.-Y. and Day, J. W.

*Ocean and Coastal Management* 47(11-12 SPEC. ISS.): 597-623. (2005)

NAL Call #: GC1000.O3; ISSN: 0964-5691

**Abstract:** We review the multiple ecological impacts of oil and gas development on coastal ecosystems in the Mississippi Delta. This area has one of the greatest developments of oil and gas production in the world. This activity has generated significant impacts on coastal ecosystems due to the toxicity of spilled oil and the secondary and indirect effects of petroleum-related activities, such as alteration of hydrology. Effects on plant communities include disruption of plant-water relationships, direct impacts to plant metabolism, toxicity to living cells, and reduced oxygen exchange between the atmosphere and the soil. Effects on consumers include growth inhibition, reduced production, altered metabolic systems, and biomagnification of hydrocarbon compounds. Petroleum-related activities have contributed significantly to wetland loss in the Delta. Subsidence was increased by 2-3 times due to fault activation. Canals altered natural hydrology by altering water flow pathways, increasing saltwater intrusion, and reducing overland flow and sediment inputs. The combination of these factors increased plant stress and plant death.

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**929. The role of the Mississippi River in wetland loss in southeastern Louisiana USA.**

Kesel R. H.

*Environmental Geology and Water Sciences* 13(3): 183-194. (1989)

NAL Call #: QE1.E5; ISSN: 0177-5146

*Descriptors:* overbank flow/ sedimentation/ reservoir dam/ resource management

*Abstract:* The suspended load of the Lower Mississippi River has decreased almost 80 percent since 1850. The long-term suspended sediment record can be loosely subdivided into three phases: a historic interval prior to 1900, a predam period (1930-1952) and a postdam period (1963-1982). The suspended load decreased 43 percent from the historic to the predam period and 51 percent from the predam to the postdam period. The decreases in suspended load after 1952 coincide with the construction of reservoirs and dams on the Missouri and Arkansas rivers. Earlier decreases may be the result of changes in land use measurement practices. The decrease in suspended load and the elimination of overbank flow by the construction of artificial levees are considered to be major causes of coastal wetland loss in southeastern Louisiana. During the historic period sediment accumulation of the marsh surface was greater than the rate of water level rise. During the pre and postdam periods, the rate of water level rise exceeded sediment accretion on the marsh surface. Although the elimination of overbank sediment clearly exacerbated the wetlands loss, an accelerated rate of water level rise during the past 25 years has been a dominant factor. Based on estimates of available overbank sediment, it is suggested that the most viable management strategy for the wetlands would be the diversion of sediment into selected areas where the land loss is most critical.

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**930. Sixteen years of old-field succession and reestablishment of a bottomland hardwood forest in the Lower Mississippi Alluvial Valley.**

Battaglia, L. L.; Minchin, P. R.; and Pritchett, D. W.

*Wetlands* 22(1): 1-17. (2002)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

*Descriptors:* bottomland/ reforestation/ vegetation establishment/ succession/ species composition/ distribution patterns/ elevation/ ecology/ on-site investigations/ old fields/ forests/ trees/ *Celtis laevigata*/ *Fraxinus pennsylvanica*/ USA, Louisiana/ USA, Louisiana, Mississippi R./ sugarberry/ green ash

*Abstract:* In the Lower Mississippi Alluvial Valley (LMAV), losses of bottomland hardwood forests have been severe, with less than 30% of the original 10 million ha remaining. Reforestation of abandoned farmland is occurring, but there has been little research on natural reestablishment of these forests. We examined understory succession and tree establishment patterns in a 3.2-ha field in northeast Louisiana, USA, abandoned in 1984. Relative elevation, strongly correlated with flooding depth and frequency, varied by approximately 1m. Ground-layer composition was monitored from 1985 to 1999 in twenty 1-m super(2) quadrats stratified along the elevation gradient. In 2000, shrubs and tree saplings were mapped and their relative elevations determined. Ordination of the ground-layer data revealed that the major trends in species composition were related to time-since-abandonment and elevation. Annual species gradually declined, woody perennials became more

abundant, and a shrub and young tree layer emerged from beneath the ground layer, but species composition in low and high elevation plots did not converge. Obligate species were more common at lower elevations, while facultative species were more common at upper elevations. By 16 years after abandonment, a total of 16 tree and shrub species had established in the field; eleven of these had potential local seed sources on levees adjacent to the study site. Abundance of dominant species was significantly related to elevation in most cases. In addition, distance to seed source influenced density and spatial distribution of *Celtis laevigata* and *Fraxinus pennsylvanica*. Our study suggests that rate and pattern of secondary succession in LMAV bottomlands are strongly influenced by elevation, dispersal mode of species, and the composition and proximity of forest remnants. Successful restoration of bottomland forests will require an improved understanding of these factors.

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**931. Spring bird migration in Mississippi alluvial valley forests.**

Wilson, R. Randy and Twedt, Daniel J.

*American Midland Naturalist* 149(1): 163-175. (2003)

NAL Call #: 410 M58; ISSN: 0003-0031

*Descriptors:* alluvial valley forests/ bottomland hardwood forest/ silvicultural management/ spring bird migration

*Abstract:* We surveyed forest songbirds during migration in bottomland hardwood forest stands and managed cottonwood (*Populus deltoides*) plantations in northeast Louisiana and west-central Mississippi between 24 March and 24 May 1996 and 1997. We detected more bird species in bottomland hardwood stands than in cottonwood stands. Within hardwood stands, we detected more individuals in stands subjected to uneven-aged timber harvest than in unmanaged stands. Early in migration, avian species composition was similar in both forest types, being comprised mainly of short-distance migrants. Bird species composition in these forest types became increasingly disparate as long-distance neotropical-nearctic migrants arrived. Ten bird species were characteristic of bottomland hardwood forests, whereas eight different species were characteristic of managed cottonwood plantations. Because these two forest types supported different bird communities, both forest types provide important inland stopover habitat during migration. Silvicultural management of bottomland hardwood forests that increases their understory vegetation will provide forested habitat for a more species rich and abundant population of songbirds during migration.

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**932. Structure and composition of three swamp forests on the Mississippi alluvial plain of Kentucky's Jackson Purchase Region.**

Bryant, William S.

*Transactions of the Kentucky Academy of Science* 58(2): 85-91. (1997)

NAL Call #: 500 K13T; ISSN: 0023-0081

*Descriptors:* basal areas/ composition/ structure/ three swamp forests

*Abstract:* Three swamp forests on the Mississippi alluvial plain of the Jackson Purchase Region of Kentucky are described. One forest was dominated by *Taxodium distichum*, one by *Nyssa aquatica*, and one by *T. distichum*

and *N. aquatica*. In terms of basal areas and densities, these forests compared favorably to other little disturbed swamps in the southeastern United States. Basal areas of 56.5, 72.8, 84.6 ml/ha were two to three times greater than most mature upland forests of Kentucky. These swamps are remnants of a once more abundant wetland system on the Mississippi alluvial plain.

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### 933. The use of wetlands in the Mississippi Delta for wastewater assimilation: A review.

Day, J. W.; Ko, J. Y.; Rybczyk, J.; Sabins, D.; Bean, R.; Berthelot, G.; Brantley, C.; Cardoch, L.; Conner, W.; Day, J. N.; Englande, A. J.; Feagley, S.; Hyfield, E.; Lane, R.; Lindsey, J.; Mistich, J.; Reyes, E.; and Twilley, R.

*Ocean & Coastal Management* 47(11-12): 671-691. (2004)  
NAL Call #: GC1000.O3; ISSN: 0964-5691

<http://www.clemson.edu/baruch/pubs/wetlandtreatment.pdf>

**Descriptors:** wetlands/ sewage disposal/ marshes/ accretion/ water quality/ sedimentation/ wastewater treatment/ waste water/ nutrients (mineral)/ economic benefits/ subsidence/ environmental effects/ deltas/ economic analysis/ effluents/ coastal zone management/ nitrogen/ denitrification/ nutrients/ benefits/ productivity/ accumulation/ vegetation/ capital/ surface water/ reviews/ case studies/ phosphorus/ USA, Louisiana, Mississippi Delta/ coastal zone management/ pollution - control and prevention/ protective measures and control/ wastewater treatment processes/ water and wastewater treatment

**Abstract:** The use of wetlands for treatment of wastewaters has a number of important ecological and economic benefits. Adding nutrient rich treated wastewater effluent to selected coastal wetlands results in the following benefits: (1) improved effluent water quality; (2) increased accretion rates to help offset subsidence; (3) increased productivity of vegetation; and (4) financial and energy savings of capital not invested in conventional tertiary treatment systems. We present as case studies results from several wetlands that are receiving secondarily treated wastewater in coastal Louisiana. At one site where sedimentation accumulation was measured, rates of accretion increased significantly after wastewater application began in the treatment site (from 7.8 to 11.4 mm yr super(-1)) and approached the estimated rate of regional relative sea level rise (RSLR) (12.0 mm yr super(-1)). No corresponding increase was observed in an adjacent control site. This suggests that the application of nutrient-rich wastewater can help coastal wetlands survive sea level rise. In the same site, surface water nutrient reduction, from the effluent inflow to outflow (1600 m), ranged from 100% for nitrate-nitrogen (NO<sub>3</sub>-N) to 66% for total phosphorus (P). At a second site, a forested wetland that has been receiving wastewater effluent for 50 years, N and P were both reduced by more than 90%. Nutrient reduction is due to three main pathways: burial, denitrification and plant uptake. Dendrochronological analysis at the second site revealed that stem growth increased significantly in the treatment site after wastewater applications began, and was significantly greater than an adjacent control site. Similar increases in productivity have been measured in a number of wetland treatment sites. Economic analyses comparing conventional and wetland systems indicate savings range from \$500, 000 to \$2.6 million. In addition there are substantial energy savings.

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### 934. Vegetation, substrate and hydrology in floating marshes in the Mississippi River Delta Plain wetlands, USA.

Sasser, C. E.; Gosselink, J. G.; Swenson, E. M.; Swarzenski, C. M.; and Leibowitz, N. C.

*Vegetatio* 122(2): 129-142. (1996)

NAL Call #: 450 V52; ISSN: 0042-3106

**Descriptors:** wetlands/ marshes/ hydrology/ vegetation patterns/ buoyancy/ substrates/ plant populations/ *Spartina*/ USA, Louisiana/ USA, Louisiana, Mississippi Delta/ plant populations/ substrata/ vegetation patterns/ substrates/ *Panicum*/ *Sagittaria*/ *Eleocharis*

**Abstract:** In the 1940s extensive floating marshes (locally called 'flotant') were reported and mapped in coastal wetlands of the Mississippi River Delta Plain. These floating marshes included large areas of *Panicum hemitomon*-dominated freshwater marshes, and *Spartina patens*/*Scirpus olneyi* brackish marshes. Today these marshes appear to be quite different in extent and type. We describe five floating habitats and one non-floating, quaking habitat based on differences in buoyancy dynamics (timing and degree of floating), substrate characteristics, and dominant vegetation. All floating marshes have low bulk density, organic substrates. Nearly all are fresh marshes. *Panicum hemitomon* floating marshes presently occur within the general regions that were reported in the 1940's by O'Neil, but are reduced in extent. Some of the former *Panicum hemitomon* marshes have been replaced by seasonally or variably floating marshes dominated, or co-dominated by *Sagittaria lancifolia* or *Eleocharis baldwinii*.  
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### 935. Waterfowl use of forested wetlands of the southern United States: An overview.

Fredrickson, L. H. and Heitmeyer, M. E.

In: *Waterfowl in winter*/ Weller, M. W.

Minneapolis: University of Minnesota Press, 1988; pp. 307-323

NAL Call #: QL696.A52W38

**Descriptors:** Anatidae/ wildlife management/ habitat exploitation/ semiaquatic habitat/ forest/ wetland/ USA/ South/ wetland forests/ habitat exploitation and wildlife management/ overview

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### 936. Wetland soil formation in the rapidly subsiding Mississippi River Deltaic Plain USA mineral and organic matter relationships.

Nyman J. A.; Delaune R. D.; and Patrick W. H.

*Estuarine, Coastal and Shelf Science* 31(1): 57-70. (1990)

NAL Call #: GB451.E72; ISSN: 0272-7714

**Descriptors:** coastal marsh/ soil structure/ erosion/ planning/ mineral/ vertical accretion/ organic matter/ submergence rate/ inactive delta zone/ active delta zone/ marine vs. fresh water/ marsh

**Abstract:** The elevation of submerging coastal marshes is maintained by vertical accretion of mineral and organic matter. Submergence rates currently exceed 1.0 cm year<sup>-1</sup> in the Mississippi Deltaic Plain and are expected to increase. Mineral matter-organic matter relationships were examined in surface profiles of Mississippi Deltaic Plain soil from both Active Delta Zone marsh (which receives freshwater and mineral sediment from the Atchafalaya or Mississippi Rivers) and Inactive Delta Zone marsh (which relies on rainfall for freshwater and on reworked sediments

for mineral matter) to gain insights into marsh soil structure and formation. Mineral and organic matter accounted for 4-14% of soil volume. The remainder was pore space and was occupied by water and entrapped gases. Organic matter occupied more volume than mineral matter in all but saline marsh soil. The regular influx of mineral matter to active fresh marsh resulted in active fresh marsh soil containing twice as much mineral and organic matter as inactive fresh marsh soil. Within the Inactive Delta Zone, the volume of mineral and organic matter increased from fresh (inland) to saline (seaward) marshes. Saline marsh soil required 1.7 times as much mineral matter as brackish marsh soil to vertically accrete at similar rates, possibly as a result of soil bulk density requirements of the dominant saline marsh plant, *Spartina alterniflora*. Vertical accretion rates were highest in the Active Delta Zone, probably as a

result of increased mineral matter availability and delivery. Current, best estimates of the combination of mineral and organic matter required ( $\text{g m}^{-2} \text{ year}^{-1}$ ) to maintain marsh surface-water level relationship are fresh marsh: organic matter= $1700+269x$ , mineral matter= $424x$ ; brackish marsh: organic matter= $553+583x$ , mineral matter= $1052x$ ; saline marsh: organic matter= $923+601x$ , mineral matter= $1798x$ , where  $x$ =the rate of submergence ( $\text{cm year}^{-1}$ ).  
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**937. Wetlands: Impacts of energy development in the Mississippi Delta.**

Ko, Jae-Young and Day, John W.  
In: Encyclopedia of Energy; Vol. 6 Elsevier, 2004; pp. 397-408  
[http://www.lsu.edu/cei/research\\_projects/Wetlands\\_final.pdf](http://www.lsu.edu/cei/research_projects/Wetlands_final.pdf)

**Effects of Agricultural Conservation Practices on Wetlands**

**938. Agronomic implications of waterfowl management in Mississippi ricefields.**

Manley, Scott W.; Kaminski, Richard M.; Reinecke, Kenneth J.; and Gerard, Patrick D.  
*Wildlife Society Bulletin* 33(3): 981-992. (2005)  
NAL Call #: SK357.A1W5; ISSN: 0091-7648  
*Descriptors:* wetlands/ habitat management/ winter flooding/ agronomic benefit/ straw disposal  
*Abstract:* Ricefields are important foraging habitat for waterfowl and other waterbirds in several North American wintering areas, including the Mississippi Alluvial Valley (MAV). Rice growers are likely to adopt management practices that provide habitat for waterfowl if agronomic benefits also occur. Therefore, we conducted a replicated field experiment during autumn through spring 1995-1997 to study effects of postharvest field treatment and winter-water management on agronomic variables including biomass of residual rice straw, cool-season grasses and forbs (i.e., winter weeds), and viability of red rice (*oryza sativa* var.). The treatment combination of postharvest disking and flooding until early March reduced straw 68%, from 9,938 kg/ha after harvest to 3,209 kg/ha in spring. Treatment combinations that included flooding until early March were most effective in suppressing winter weeds and decreased their biomass in spring by 83% when compared to the average of other treatment combinations. Effects of treatment combinations on spring viability of red rice differed between winters, but no significant effects were found within winters. Autumn disking followed by flooding until early March reduced rice straw and suppressed winter weeds the most, but with additional costs. To obtain the most agronomic benefits, we recommend that rice growers forgo autumn disking and flood fields until early March, which will provide moderate straw reduction, good weed suppression, and predicted savings of \$22.24-62.93/ha (U.S.) (\$9.00-25.47/ac). Maintenance of floods on ricefields until early March also benefits waterfowl and other waterbirds by providing foraging habitat throughout winter.  
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**939. Arsenic and mercury concentrations in major landscape components of an intensively cultivated watershed.**

Cooper, C. M. and Gillespie, W. B.  
*Environmental Pollution* 111(1): 67-74. (2000)  
NAL Call #: QH545.A1E52; ISSN: 0269-7491  
*Descriptors:* wetlands/ arsenic/ mercury/ watersheds/ bioaccumulation/ stormwater runoff/ water pollution/ sediment pollution/ agricultural runoff/ flood plains/ aquatic organisms/ soil contamination/ sediment contamination/ fish/ runoff/ mercury-197/ pollution (soil)/ pollution (water)/ contaminated sediments/ fish/ catchment areas/ Pisces/ freshwater fish/ USA, Mississippi R.  
*Abstract:* To provide an understanding of arsenic (As) and mercury (Hg) concentrations in soil, sediment, water, and fish tissues, samples were collected from a Mississippi River alluvial floodplain located in northwest Mississippi. As concentrations increased approximately an order of magnitude from water (5.12  $\mu\text{g/l}$ ) to fish tissues (36.99  $\mu\text{g/kg}$ ) and an additional two orders of magnitude in soils, lake sediments, and wetland sediments (5728, 5614, and 6746  $\mu\text{g/kg}$ ), respectively. Average Hg concentrations in water, soils, lake sediments, and fish were 2.16  $\mu\text{g/l}$ , 55.1, 14.5 and 125  $\mu\text{g/kg}$ , respectively. As and Hg concentrations were within published ranges for uncontaminated soil, water, and sediments. As concentrations represented a low risk. Hg concentrations were also low but showed a greater tendency to concentrate in fish tissue. The dominant mode of entry of these materials into aquatic systems is through storm-generated runoff. Since both metals accompany sediments, agricultural conservation practices such as reduced tillage, buffer riparian strips, and bordering sediment ponds or drainage wetlands will minimize watershed input to aquatic systems.  
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**940. Assessment of cumulative impacts to water quality in a forested wetland landscape.**

Childers, D. L. and Gosselink, J. G.

*Journal of Environmental Quality* 19(3): 455-464. (1990)

NAL Call #: QH540.J6; ISSN: 0047-2425

*Descriptors:* wetlands/ water quality/ land use/ environmental impact/ river basin management/ nutrients (mineral)/ nitrogen/ phosphorus/ resuspended sediments/ turbidity/ agricultural runoff/ rivers/ basins/ USA, Louisiana, Tensas Basin/ river basin management/ nutrients (mineral)/ turbidity/ mechanical and natural changes/ freshwater pollution

*Abstract:* Assessment of cumulative impacts requires a landscape approach and large-scale analysis. In the authors' procedure for determining cumulative impacts in bottomland hardwood forests (BLHF), changes in landscape integrity over time were assessed using structural and functional ecosystem indices. In this article researchers present a historical analysis of water quality in the Tensas Basin, Louisiana, USA, as part of the cumulative impacts analysis of this BLHF landscape. Historical records of suspended sediment, N, P, and turbidity from three streams in the Tensas Basin were analyzed. Significant positive relationships between water levels in these streams and concentrations of total P, total Kjeldahl N, total suspended sediment, and turbidity confirmed a loading phenomenon characteristic of watersheds in which much of the original forest cover has been cleared. Eighty-five percent of the original forest in the Tensas Basin has been converted to agricultural fields. Temporal trends in nutrient concentration show that water quality has been declining steadily since 1958 in one river, whereas in the other two the decline largely occurred before then. A goal-oriented management plan for improved water quality in the Tensas Basin was devised based on this cumulative impact assessment.

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**941. Associations between changes in agriculture and hydrology in the Cache River Basin, Arkansas, USA.**

Wilber, D. H.; Tighe, R. E.; and O'neil, L. J.

*Wetlands* 16(3): 366-378. (1996)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

*Descriptors:* agriculture/ hydrology/ ground water/ land use/ rivers/ rice fields/ groundwater/ forest hydrology/ USA, Arkansas, Cache R./ forested wetlands/ groundwater/ forest hydrology/ flow rate/ ground water/ rice fields

*Abstract:* Impacts to the hydrology of the Cache River, a major river system in the Mississippi Alluvial Valley, were assessed by integrating hydrologic analyses with a review of historical land use changes. Extreme low flows have become more frequent in recent years, coincident with a dramatic increase in rice farming in the basin and its associated irrigation. Annual drawdowns in the alluvial aquifer were positively correlated with the annual area of rice crops. There is no evidence that a change in climatic conditions accounts for the increase in extreme low flow frequency. In fact, multiple regression analyses indicate the relationship between climate and flow is weakest in more recent decades when extreme low flows were more prevalent. Low flows in the summer (when rice irrigation occurs) were least associated with climate in most recent decades. Average monthly flows for August and September have increased, which is also an impact consistent with rice agriculture practices. Water is drained from rice fields to

surface-water drainages at the end of the summer and may eventually reach the Cache River, thus increasing late summer flows. The timing and nature of changes in agricultural practices within the Cache River basin suggest agricultural impacts have contributed to the observed changes in hydrology.

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**942. Harvesting impacts on selected floral and faunal communities in the Mississippi River batture lands: Pre-treatment measurements.**

Lockhart, Brian R.; Thompson, Lynne C.; Tappe, Philip A.; Peitz, David G.; Weih, Robert C.; Guo, Yanfei; Brown, Nicholas R.; Lawson, Edwin R.; and Ku, Timothy T.

In: Proceedings of the southern forested wetlands ecology and management conference/ Flynn, Kathryn M.

Clemson: Consortium for Research on Southern Forested Wetlands, 1996; pp. 30-35

*Descriptors:* animals and man/ disturbance by man/ commercial activities/ ecology/ habitat/ terrestrial habitat/ land and freshwater zones/ Nearctic region/ North America/ USA/ Carabidae/ Aves: forestry/ practices/ community structure relationship/ USA/ community structure/ forestry practices effect/ forest and woodland/ Mississippi/ Issaquena County/ Pittman Island/ influence of forestry practices/ bottomland forest/ Carabidae/ Caraboidea, Adephaga, Coleoptera, Insecta/ arthropods/ birds/ chordates/ Coleopterans beetles/ insects/ invertebrates/ vertebrates

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**943. Impact of forest type and management strategy on avian densities in the Mississippi Alluvial Valley, USA.**

Twedt, D. J.; Wilson, R. R.; Henne-Kerr, J. L.; and Hamilton, R. B.

*Forest Ecology and Management* 123(2-3): 261-274. (1999)

NAL Call #: SD1.F73; ISSN: 0378-1127

*Descriptors:* agro-forestry/ avian density/ bottomland hardwood forests/ cottonwood plantations/ forest birds/ forest management effects/ silviculture/ avifauna/ density/ forest management/ species richness/ United States/ *Geothlypis trichas*/ *Hylochichla mustelina*/ *Icteria virens*/ *Passerina cyanea*/ *Populus deltoides*/ *Vireo griseus*

*Abstract:* Avian territory densities were determined from 20 Breeding Bird Censuses in mature (>30 years) bottomland hardwood stands and 18 Breeding Bird Censuses in young (6-9 years old) cottonwood (*Populus deltoides*) plantations in the Mississippi Alluvial Valley. Avian species richness, diversity, and territory density were greater ( $p < 0.01$ ) in bottomland hardwood stands than in intensively-managed cottonwood stands but these parameters were not impacted by selective timber harvest within bottomland hardwood stands nor by method of regeneration within cottonwood plantations ( $p > 0.05$ ). Even so, detrended correspondence analysis based on avian territory densities readily segregated forest types and silvicultural treatments. Timber harvest within bottomland hardwood stands resulted in a shift in bird communities toward those found in cottonwood stands by increasing the densities of early-successional species such as Indigo Bunting (*Passerina cyanea*), Yellow-breasted Chat (*Icteria virens*), and Common Yellowthroat (*Geothlypis trichas*). Conversely, regenerating cottonwood stands from root sprouts; rather than planting stem cuttings, resulted in a shift in bird communities toward those found in bottomland hardwood

stands by increasing densities of species such as White-eyed Vireo (*Vireo griseus*) and Wood Thrush (*Hylocichla mustelina*). Tree species diversity, angular canopy cover, and midstory density were positively associated with bird species assemblages in bottomland hardwood stands, whereas vegetation density at ground level was positively associated with bird communities in cottonwood plantations. Conversion of agricultural fields to short-rotation cottonwood plantations results in increased breeding bird populations by adding up to 140 additional territories 40 ha<sup>-1</sup>. Even so, relative conservation values, derived from indicator species analysis and Partners in Flight concern scores, suggest that mature bottomland hardwood forests are twice as 'valuable' for bird conservation as are cottonwood plantations.  
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**944. Insecticide concentrations in ecosystem components of an intensively cultivated watershed in Mississippi.**

Cooper C. M.

*Journal of Freshwater Ecology* 6(3): 237-248. (1991)

NAL Call #: QH541.5.F7J68; ISSN: 0270-5060

*Descriptors:* fish/ contamination/ cotton/ soybean/ rice/ bioaccumulation/ lake/ sediment/ wetland/ insecticide/ persistence/ watershed management

*Abstract:* Concentrations of three currently used insecticides (fenvalerate, permethrin, and methyl parathion) were documented in major watershed components of Moon Lake, Mississippi, [USA] and its 166 km<sup>2</sup> watershed over a three year period. Moon Lake (10.1 km<sup>2</sup>), an oxbow of the Mississippi River, receives flow through a series of wetlands from a flatland watershed intensively cultivated in cotton, soybeans, and rice. None of the three insecticides were detected in watershed soils, but they were found sporadically in wetland and lake sediments, water and fish. Twenty-six percent of the 110 fish collected had measurable concentrations of the insecticides. Detection of all three insecticides, especially methyl parathion, in fish tissue suggested that they have sufficient persistence for uptake and, perhaps, bioaccumulation. The occurrence of banned organochlorine insecticides in the ecosystem was also observed, especially during runoff, and it also indicated the importance of watershed management practices on long term water quality.

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**945. Water quality of seasonally flooded agricultural fields in Mississippi, USA.**

Maul, J. D. and Cooper, C. M.

*Agriculture, Ecosystems & Environment* 81(3): 171-178. (2000)

NAL Call #: S601.A34; ISSN: 0167-8809

*Descriptors:* wetlands/ water quality/ seasonal variations/ flooding/ agriculture/ runoff/ water quality (natural waters)/ seasons/ floods and flooding/ USA, Mississippi

*Abstract:* Planned flooding of agricultural fields is performed to prevent erosion (e.g. sheet, gully, and rill) and provide habitat for waterfowl. As a post-harvest field treatment, flooding is becoming more common in the agriculturally dominated landscape of the Mississippi Alluvial Valley (MAV) in the southeastern United States. Despite this trend, information pertaining to water quality characteristics of water remaining on fields during the winter and subsequent relationships with environmental

and biological processes is sparse. Because the water retained on fields is eventually released into adjacent waterways prior to planting, it is critical to monitor water quality parameters of these flooded fields. Water quality parameters of flooded agricultural fields were assessed from January to March and compared to those observed in impounded wetlands. Temporal variation of parameters among sampling dates was also examined. Mean (plus or minus S.E.) suspended solids concentration was greater ( $p < 0.05$ ) in flooded agricultural fields (283.3 plus or minus 98.7 mg l super(-1)) than impounded wetlands (79.5 plus or minus 25.3 mg l super(-1)) and an interaction of habitat and sampling date was detected on dissolved solids concentration ( $p < 0.05$ ). Water temperature, pH, dissolved oxygen, ammonia, nitrate, total phosphorus, enterococci bacteria, and fecal coliform bacterial concentrations exhibited temporal variation among sampling dates ( $p < 0.05$ ). For both flooded fields and wetlands, fecal coliform and enterococci concentrations peaked at 2887.5 and 675.0 colony forming units (CFU) 100 ml super(-1), respectively, during the first sampling date (January) and declined to 133.2 and 33.3 CFU 100 ml super(-1), respectively, in March. Results of this study indicated that: (1) flooded agricultural fields had greater variability of water quality parameters than wetlands; (2) 53% of measured water quality parameters exhibited temporal variation and (3) impounding water may facilitate decreases in bacterial concentrations. Holding water on agricultural fields and knowledge of temporal water quality trends may provide a means to decrease contaminant concentrations, thus improving quality of potential runoff that may enter adjacent bodies of water.

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## Wetlands as Agricultural Conservation Practices

### 946. Addressing global warming and biodiversity through forest restoration and coastal wetlands creation.

Williams, J. R.

*Science of the Total Environment* 240(1-3): 1-9. (Oct. 1999)

*Notes:* Special issue: Managing for biodiversity for the protection of nature

*Descriptors:* wetlands/ habitat improvement/ climatic changes/ biodiversity/ environment management/ global warming/ forests/ environmental restoration/ biological diversity/ greenhouse gases/ soil erosion/ wood wastes/ compost/ research programs/ USA, Louisiana/ USA, Mississippi River Valley/ research priorities/ habitats/ erosion control/ USA/ protective measures and control/ environmental action/ air pollution

*Abstract:* The Climate Challenge is a partnership between the Department of Energy and the electric utility industry to reduce, avoid, and sequester greenhouse gases. A portion of the initiative, the sequestration of greenhouse gases, is the focus of this presentation. Over 4 million acres of bottomland hardwood forests were cleared for agriculture in the Mississippi River Valley in the 1970s. Reestablishing these forests would improve depleted wildlife habitats, serve as wildlife corridors, increase biodiversity, and decrease soil erosion. Also, Louisiana is losing coastal wetlands at a rate of approximately 25 square miles/year. This coastal erosion is due to a number of factors and many efforts are currently underway to address the matter. One such effort is the use of material generated in the dredging of navigational canals; however, this material is low in nutrient value, making the regeneration of marsh grasses more difficult. In addition, bottomland hardwood forests and coastal wetland grasses are excellent 'carbon sinks' because they take carbon dioxide out of the atmosphere and store it in living plant tissue. Entergy Services, Inc. is an electric utility with a service territory that comprises portions of both the Lower Mississippi River Valley and the Gulf of Mexico coastline. This provides an opportunity to positively address both habitat losses noted above while at the same time addressing global warming, forest fragmentation, and biodiversity. Entergy, through its affiliation with the UtiliTree Carbon Company, is participating in projects that will investigate the feasibility of using bottomland hardwood reforestation on cleared marginal farmlands now managed by the Louisiana Department of Wildlife and Fisheries and the US Fish and Wildlife Service. Entergy has also begun a research project with the Environmental Protection Agency and the state of Louisiana. The research is a compost demonstration project that will utilize wood waste generated through our tree-trimming program as a compost material that will be mixed with low nutrient dredge material to create new coastal wetlands. Taken together, Entergy's initiatives will be able to address global warming through carbon sequestration, restore fragmented forest habitats, reduce coastal erosion and improve the quality of a vital coastal aquatic nursery habitat. Efforts will be made to manage the created habitats for biodiversity. Pulling all these ideas together creates an effect in which the whole is greater than the sum of the parts. In such a synergy of ideas, there are no losers and the winners are both industry participants and the environment.

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### 947. Avian response to bottomland hardwood reforestation: The first 10 years.

Twedt, Daniel J.; Wilson, R. Randy; Henne-Kerr, Jackie L.; and Grosshuesch, David A.

*Restoration Ecology* 10(4): 645-655. (2002)

*NAL Call #:* QH541.15.R45R515; *ISSN:* 1061-2971

*Descriptors:* conservation/ conservation measures/ ecology/ habitat utilization/ habitat/ terrestrial habitat/ land and freshwater zones/ Nearctic region/ North America/ USA/ Aves: habitat management/ reforestation strategies/ habitat colonization relations/ habitat colonization/ reforestation strategy relations/ Louisiana and Mississippi/ forest and woodland/ bottomland hardwood/ Louisiana/ Madison Parish/ Mississippi/ Issaquena County/ reforestation strategy relations/ Aves/ birds/ chordates/ vertebrates

*Abstract:* Bottomland hardwood forests were planted on agricultural fields in Mississippi and Louisiana predominantly using either *Quercus* species (oaks) or *Populus deltoides* (eastern cottonwood). We assessed avian colonization of these reforested sites between 2 and 10 years after planting. Rapid vertical growth of cottonwoods (circa 2-3 m/year) resulted in sites with forest structure that supported greater species richness of breeding birds, increased Shannon diversity indices, and supported greater territory densities than on sites planted with slower-growing oak species. Grassland birds (*Spiza americana* [Dickcissel] and *Sturnella magna* [Eastern Meadowlark]) were indicative of species breeding on oak-dominated reforestation no more than 10 years old. *Agelaius phoeniceus* (Red-winged Blackbird) and *Colinus virginianus* (Northern Bobwhite) characterized cottonwood reforestation no more than 4 years old, whereas 14 species of shrub-scrub birds (e.g., *Passerina cyanea* [Indigo Bunting]) and early-successional forest birds (e.g., *Vireo gilvus* [Warbling vireo]) typified cottonwood reforestation 5 to 9 years after planting. Rates of daily nest survival did not differ between reforestation strategies. Nest parasitism increased markedly in older cottonwood stands but was overwhelmed by predation as a cause of nest failure. Based on Partners in Flight prioritization scores and territory densities, the value of cottonwood reforestation for avian conservation was significantly greater than that of oak reforestation during their first 10 years. Because of benefits conferred on breeding birds, we recommend reforestation of bottomland hardwoods should include a high proportion of fast-growing early successional species such as cottonwood.

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### 948. Bottomland hardwood forest management for black bears in Louisiana.

Weaver, K. M.; Tabberer, D. K.; Moore, L. U.; Chandler, G. A.; Posey, J. C.; and Pelton, M. R.

In: Proceedings of the 44th Annual Conference Southeastern Association of Fish and Wildlife Agencies. (Held 24 Oct 1990 at Richmond, Va.); Vol. 44.: Southeastern Association of Fish and Wildlife Agencies; pp. 342-350; 1990.

*NAL Call #:* SK1.S6

*Descriptors:* telemetry/ forest practices/ techniques/ North America/ United States/ Louisiana/ Northeast Region

*Abstract:* Recommendations were outlined for bear habitat management based on a review of the literature and preliminary evidence from ongoing studies that were developed in concert with the Tensas River National Wildlife Refuge Forest Habitat Management Plan.  
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**949. Bottomland hardwood reforestation for neotropical migratory birds: Are we missing the forest for the trees?**

Twedt, Daniel J. and Portwood, Jeff  
*Wildlife Society Bulletin* 25(3): 647-652. (1997)  
NAL Call #: SK357.A1W5; ISSN: 0091-7648  
*Descriptors:* behavior/ birds/ bottomlands/ ecosystems/ forestry practices/ forests, deciduous/ habitat management/ habitat use/ management/ migration/ succession/ wildlife/ bottomland forests/ afforestation/ wild birds/ natural resources/ forest practices/ forests/ growth/ habitat management for wildlife/ hardwoods/ land, private/ oak/ plant succession/ planting/ rehabilitation/ seeding/ species diversity/ wildlife management/ neotropical migrant  
*Abstract:* The authors identify the benefits derived by land managers and wildlife resources when fast-growing trees, such as cottonwood or sycamore, alone or mixed with oaks, are established on lands under cultivation. Reforestation with fast-growing species promotes rapid colonization of sites by forest-breeding neotropical migrants. The authors recommend silvicultural practices to promote succession from the fast-growing trees to forests dominated by heavy-seeded, slow-growing species. klf.  
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**950. Bottomland hardwood reforestation in the lower Mississippi Valley.**

Allen, James A. and Kennedy, Harvey E.  
Slidell, La.: U.S. Dept. of the Interior, Fish and Wildlife Service, National Wetlands Research Center, 1989. 28 p.  
NAL Call #: SD409.A46  
*Descriptors:* reforestation---Mississippi River Valley/ reforestation---southern states/ hardwoods---Mississippi River Valley/ hardwoods---southern states/ forests and forestry---Mississippi River Valley/ forests and forestry---southern states  
This citation is from AGRICOLA.

**951. Characterization of soil processes in bottomland hardwood wetland-nonwetland transition zones in the lower Mississippi River valley.**

Faulkner, S. P.; Patrick, W. H.; Gambrell, R. P.; Parker, W. B.; and Good, B. J.  
Washington, D.C.: U.S. Army Corps of Engineers; WRP 91-1, 1991. 308 p., 55 fig., 11 tab., 212 ref., 19 append.  
*Notes:* "Final Report." Army Corps of Engineers Contract Report WRP-91-1  
*Descriptors:* bottomland/ floodplain forests/ hardwood/ Mississippi-Missouri River basin/ soil properties/ wetland soils/ oxidation-reduction potential/ oxygen/ soil saturation/ water table/ lakes/ water in soils  
*Abstract:* The results of a 4-yr study of bottomland hardwood soils, the purpose of which was to characterize the effects of saturation and inundation on soil processes in nonwetland, transitional, and wetland habitats are presented. Data are provided for identifying and delineating wetlands from non-wetlands in the Lower Mississippi River Valley, and detailed technical information for constructing

and installing equipment to measure soil redox potential and oxygen content is provided. Soil redox potential, oxygen content, water table depth were measured at several soil depths on five transects in Louisiana and Mississippi. These data were compared with soil profile descriptions, hydrologic zonal classification, and the presence of hydric soils to determine the relationships among soil redox conditions and diagnostic wetland indicators. Tree-coating constituents were also measured to determine if plant adaptations are effective indicators of wetland soil conditions. The results indicated that large areas of bottomland hardwood forests in the Lower Mississippi River Valley are not inundated or saturated for long periods during the growing season. There are very wet, almost permanently inundated sites, but those areas that are seasonally inundated are oxidized and aerobic throughout the root zone for most of the growing season. Saturated, anaerobic conditions for as little as 110-15% of the growing season appear sufficient to induce wetland soil characteristics (mottling, gleying, low chroma colors) in the soil profile. These wetland soil characteristics were generally more reliable than the plant root coatings in delineating wetlands. (Author's abstract) 35 002621009  
© CSA

**952. A decision-support system for prioritizing restoration sites on the Mississippi River Alluvial Plain.**

Llewellyn, D. W.; Shaffer, G. P.; Craig, N. J.; Creasman, L.; Pashley, D.; Swan, M.; and Brown, C.  
*Conservation Biology* 10(5): 1446-1455. (Oct. 1996)  
NAL Call #: QH75.A1C5; ISSN: 0888-8892  
*Descriptors:* environmental restoration/ geographic information systems/ nature conservation/ ecosystem management/ environment management/ land use/ river basins/ information systems/ forests/ alluvial fans/ river basin management/ geographical reference systems/ decision making/ decision support systems/ USA, Mississippi R./ USA, Louisiana, Mississippi Delta/ wetland forest/ geographic information systems/ nature conservation/ ecosystem management/ environment management/ reclamation/ protective measures and control/ evaluation process/ environmental action  
*Abstract:* Conversion of forested wetlands to agricultural use and the resulting fragmentation of the landscape has led to concerns for the functional integrity of the Mississippi River Alluvial Plain ecosystem. We describe an effort spearheaded by The Nature Conservancy to initiate a multi-decade partnership dedicated to creating and implementing a viable, cooperative, landscape-level restoration project in the Mississippi River Alluvial Plain. Important phases of the process during the first 5 years were (1) initiation of the development of an extensive network of partners, including state and federal agencies, private land owners, conservation groups, academicians, and other interested citizens; (2) development of a geographic information system (GIS) for the entire extent of the ecosystem; and (3) for one watershed, the Tensas basin in northeastern Louisiana, refinement of a high resolution GIS to generate more detailed land-use conversion statistics to demonstrate the feasibility of a semi-objective, landscape-scale restoration planning procedure, including methodology for prioritization of existing wetland forest patches and areas most suitable for reforestation and connection via corridors.  
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**953. Effects of managed impoundments and herbivory on wetland plant production and stand structure.**

Johnson Randall, L. A. and Foote, A. L.

*Wetlands* 25(1): 38-50. (2005)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

*Descriptors:* annual production/ *Myocastor coypus*/ *nutria*/ plant stand structure/ *Schoenoplectus americanus*/ *Spartina patens*/ wetland management

*Abstract:* Managed impoundments, a form of structural marsh management, have been used to enhance plant production in the rapidly-eroding marshes of coastal Louisiana, USA, yet few studies have quantified their effects by measuring plant production before and after impoundment construction. We tested the effects of structural marsh management on the annual aboveground production and plant stand structure (stem density and stem height) of *Spartina patens* and *Schoenoplectus americanus* by collecting measurements before and after the construction of two shallow impoundments. We manipulated the water level in each impoundment by adjusting a single flap-gated culvert fitted with a variable crest weir. Because *nutria* herbivory also seemed to have a strong influence on plant production in these marshes, we tested the effects of *nutria* herbivory on the annual aboveground production and plant stand structure of both plant species by collecting data from fenced (ungrazed) and unfenced (grazed) plots located in both managed and unmanaged areas. There were no significant differences in *Spartina* annual production, stem density, and stem height between managed and unmanaged areas, and *Schoenoplectus* annual production, stem density, and stem height were greater in unmanaged marsh, indicating that the management method used in this study was not effective in promoting plant production in the rapidly-eroding, brackish, deltaic marshes of coastal Louisiana. *Nutria* herbivory dramatically reduced the annual aboveground production, stem density, and stem height of *Schoenoplectus*, a preferred forage species, and thus altered the structure of the mixed species stand. Herbivory had no significant effect on the annual aboveground production and stem density of *Spartina*. In the absence of herbivory, the stem height of *Spartina* increased significantly and coincided with significant increases in the stem density and height of *Schoenoplectus*. The changes in plant stand structure caused by *nutria* herbivory may facilitate marsh erosion and ultimately contribute to wetland loss. © 2005, The Society of Wetland Scientists. © 2006 Elsevier B.V. All rights reserved.

**954. Evaluation of reforestation in the Lower Mississippi River Alluvial Valley.**

King, S. L. and Keeland, B. D.

*Restoration Ecology* 7(4): 348-359. (1999)

NAL Call #: QH541.15.R45R515; ISSN: 1061-2971

*Abstract:* Only about 2.8 million ha of an estimated original 10 million ha of bottomland hardwood forests still exist in the Lower Mississippi River Alluvial Valley (LMAV) of the United States. The U.S. Fish and Wildlife Service, the U.S. Forest Service, and state agencies initiated reforestation efforts in the late 1980s to improve wildlife habitat. We surveyed restorationists responsible for reforestation in the LMAV to determine the magnitude of past and future efforts and to identify major limiting factors. Over the past 10 years, 77,698 ha have been reforested by the agencies represented in our survey and an additional 89,009 ha are

targeted in the next 5 years. Oaks are the most commonly planted species and bare-root seedlings are the most commonly used planting stock. Problems with seedling availability may increase the diversity of plantings in the future. Reforestation in the LMAV is based upon principles of landscape ecology; however, local problems such as herbivory, drought, and flooding often limit success. Broad-scale hydrologic restoration is needed to fully restore the structural and functional attributes of these systems, but because of drastic and widespread hydrologic alterations and socioeconomic constraints, this goal is generally not realistic. Local hydrologic restoration and creation of specific habitat features needed by some wildlife and fish species warrant attention. More extensive analyses of plantings are needed to evaluate functional success. The Wetland Reserve Program is a positive development, but policies that provide additional financial incentives to landowners for reforestation efforts should be seriously considered.

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**955. Functional comparison of created and natural wetlands in the Atchafalaya Delta, Louisiana.**

Faulkner, Stephen P. and Poach, Matthew E.

Vicksburg, Miss.: U.S. Army Engineer Waterways Experiment Station, 1996. 106 p. Wetlands Research Program Technical Report .

NAL Call #: TD756.5.F38 1996

*Descriptors:* wetlands---Louisiana/ constructed wetlands---Louisiana/ Atchafalaya River Watershed (La.)

This citation is from AGRICOLA.

**956. Groundwater flow patterns and water budget of a bottomland forested wetland, Black Swamp, eastern Arkansas.**

Gonthier, G. J. and Kleiss, B. A., WRIR 95-4192; Denver, CO: U.S. Geological Survey

*Notes:* Water-Resources Investigations Report: 95-4192; Branch of Information Services

*Descriptors:* wetlands/ groundwater movement/ flow pattern/ hydrologic budget/ surface-groundwater relations/ swamps/ bottomland/ forests/ interagency cooperation/ water level fluctuations/ USA, Arkansas, Black Swamp/ groundwater

*Abstract:* The U.S. Geological Survey, working in cooperation with the U.S. Army Corps of Engineers, Waterways Experiment Station, collected surface-water and ground water data from 119 wells and 13 staff gages from September 1989 to September 1992 to describe ground water flow patterns and water budget in the Black Swamp, a bottomland forested wetland in eastern Arkansas. The study area was between two streamflow gaging stations located about 30.5 river miles apart on the Cache River. Ground water flow was from northwest to southeast with some diversion toward the Cache River. Hydraulic connection between the surface water and the alluvial aquifer is indicated by nearly equal changes in surface-water and ground water levels near the Cache River. Diurnal fluctuations of hydraulic head ranged from more than 0 to 0.38 feet and were caused by evapotranspiration. Changes in hydraulic head of the alluvial aquifer beneath the wetland lagged behind stage fluctuations and created the potential for changes in ground water movement. Differences between surface-water levels in the wetland and stage of the Cache River created a frequently occurring

local groundwater flow condition in which surface water in the wetland seeped into the upper part of the alluvial aquifer and then seeped into the Cache River. When the Cache River flooded the wetland, ground water consistently seeped to the surface during falling surface-water stage and surface water seeped into the ground during rising surface-water stage. Groundwater flow was a minor component of the water budget, accounting for less than 1 percent of both inflow and outflow. Surface-water drainage from the study area through diversion canals was not accounted for in the water budget and may be the reason for a surplus of water in the budget. Even though groundwater flow volume is small compared to other water budget components, groundwater seepage to the wetland surface may still be vital to some wetland functions.  
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**957. Hand planting versus machine planting of bottomland red oaks on former agricultural fields in Louisiana's Mississippi Alluvial Plain: Sixth-year results.**

Michalek A. J.; Lockhart B. R.; Dean T. J.; Keeland B. D.; and McCoy J. W.

In: General Technical Report, Southern Research Station, SRS 48/ Outcalt K. W.; Outcalt P. A.; and Tucker R. B., 2002. 352-357

*Notes:* Conference: Proceedings of the Eleventh Biennial Southern Silvicultural Research Conference, Knoxville, Tennessee, 20-22 March 2001.

*Descriptors:* wetlands/ afforestation/ artificial regeneration/ bottomland forests/ forests/ planting/ seedlings/ survival/ Quercus texana

*Abstract:* Interest in restoring bottomland hardwoods on abandoned agricultural fields has gained considerably over the past 15 years, due primarily to federal cost-share programmes such as the Conservation Reserve Program and the Wetlands Reserve Program. While a variety of artificial regeneration techniques are available to afforest these lands, none have met with consistently successful results, especially in the Mississippi Alluvial Plain. Therefore, a study was initiated to compare a variety of regeneration techniques for afforesting previously farmed bottomland hardwood sites. In this paper we report the results from hand planted versus machine planted 1-0 bare-root bottomland red oak seedlings. Four sites in the MAP in Louisiana were planted with either 1 or 2 species in a randomized complete block design. Sites and species planted included Bayou Macon Wildlife Management Area (WMA; Nuttall oak (*Quercus nuttallii*) and willow oak (*Q. phellos*)), Lake Ophelia National Wildlife Refuge (NWR; Nuttall oak), Ouachita WMA (willow oak), and the Tensas NWR (Nuttall oak and water oak (*Q. nigra*)). Results after 6 growing seasons indicated little difference in density, survival, planting success, and stocking between planting methods. Densities ranged from 280 Nuttall oak seedlings per acre machine planted at the Tensas NWR to 67 willow oak seedlings per acre machine planted at the Bayou Macon WMA. Nuttall oak also tended to have higher survival (81%) compared to willow oak (56%) and water oak (38%). When volunteer oak and ash were included, all site-species-planting method combinations met the minimum criteria for successful afforestation, but all combinations failed to meet minimum stocking levels necessary for quality sawtimber production.

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**958. Impacts of flooding regime modification on wildlife habitats of bottomland hardwood forests in the lower Mississippi Valley.**

Klimas, C. V.; Martin, C. O.; and Teaford, J. W. Vicksburg, Miss.: U.S. Army Engineer Waterways Experiment Station; Technical Report EI-81-13, 1981. 200 p.

*Descriptors:* flood plain management/ floods/ forests/ wildlife habitats/ hardwood/ aquatic animals/ literature review/ logging/ land clearing/ Mississippi River

*Abstract:* This is a literature review concerning the impacts of flooding regime modification on bottomland hardwood forest wildlife habitats of the lower Mississippi Valley. The composition and structure of the bottomland forest are an important determinant of the quality and type of wildlife habitat available. These forest characteristics are largely influenced by the flooding regime. Overstory diversity and perennial understory diversity and productivity are lowest in near-permanently flooded habitats and increase in areas flooded less frequently and for shorter periods of time. Nonflooded areas are often, but not always, less diverse and productive than infrequently flooded areas. Tree growth, regional habitat diversity, and land clearance patterns may also be influenced by modifications to the hydrologic regime. Bottomland forests are considered productive wildlife habitat due to high soil fertility, abundant moisture, and the diversity and abundance of wildlife food and cover. Modifications in the magnitude, frequency, and duration of flooding are expected to bring about a wide variety of impacts on different species. Impacts of flooding regime modifications are discussed for mammals, birds, reptiles, and amphibians. Aquatic and semiaquatic species are generally adversely affected by flood reduction and are benefitted by normal flooding conditions. Species that are principally terrestrial may be severely impacted by major flooding events, but they may respond more to secondary influences such as land clearing and logging. Where known, both direct and indirect impacts of flooding regime modifications are discussed by species or species groups occurring in the study area.

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**959. Long-term impacts of agricultural runoff in a Louisiana swamp forest.**

Day, J. W. and Kemp, G. P.

In: Ecological Considerations in Wetlands Treatment of Municipal Wastewaters/ Godfrey, Paul J.

New York: Van Nostrand Reinhold, 1985; pp. 317-326.

*Notes:* ISBN: 0442230095

*NAL Call #:* QH545.S49E3

*Descriptors:* wetlands/ agricultural runoff/ water pollution effects/ Louisiana/ swamps/ nitrogen/ phosphorus/ agriculture/ nutrients/ denitrification/ path of pollutants/ dissolved oxygen/ phosphates

*Abstract:* A summary of a two-year research project on the dynamics of nutrient retention and release in a swamp receiving upland runoff is presented. The central objective was to estimate the capacity of this type of wetland for removing nutrients from upland runoff. The role of redox in determining floodwater nutrient concentrations, both in the field and in laboratory microcosms is examined, along with testing the hypothesis that water quality deterioration in the region can be directly related to the cessation of overland water processing formerly performed by the swamp. Under overland flow conditions, the swamp can remove significant

amounts of incoming nutrients: 21% of total N and 41% of total P were retained in the swamp. Practically all of the removal takes place because of the settling of particulate N and P. For two reasons, it is not likely that the swamp will become saturated with N and P. First, the results indicate that denitrification is a significant pathway for the permanent loss of N. Second, the swamp is subsiding at a significant rate. In spite of nutrient retention in the swamp, significant amounts are still exported to swamp bayous and lakes. The swamp, however, acts as a buffer in time and composition, as, well as in concentration. Dissolved oxygen in the water column is the single most important factor determining sediment-water exchange of PO<sub>4</sub>.

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**960. Managing forested wetlands.**

Fredrickson, L. H.

In: Ecosystem management: Applications for sustainable forest and wildlife resources. (Held 3 Mar 1994-5 Mar 1994 at Stevens Point, Wisc.) Boyce, M. S. and Haney, A. (eds.) New Haven, Conn.: Yale University Press; pp. 147-177; 1997.

NAL Call #: QH75.E295 1997

*Descriptors:* wetlands/ biodiversity/ bottomland forests/ forest management/ forests/ resource management

*Abstract:* Focusing on southern forested wetlands of the Mississippi Alluvial Valley, the discussion identifies key factors associated with wetlands and describes characteristics of forested wetlands and their current status. Current management, strategies to restore ecosystem functions and values, and the associated biodiversity are also discussed.

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**961. Potential nitrate removal from a river diversion into a Mississippi delta forested wetland.**

Lane, R. R.; Mashriqui, H. S.; Kemp, G. P.; Day, J. W.; Day, J. N.; and Hamilton, A.

*Ecological Engineering* 20(3): 237-249. (July 2003)

NAL Call #: TD1.E26; ISSN: 0925-8574

*Descriptors:* wetlands/ water quality/ swamps/ resuspended sediments/ deltas/ water sampling/ ammonium compounds/ algal blooms/ nitrates/ baseline studies/ levees/ sediment chemistry/ river water/ sediment samples/ phosphorus/ chlorophylls/ phytoplankton/ rivers/ forested wetlands/ nutrient retention/ hydrodynamics/ lakes/ sediments/ environmental restoration/ forests/ chlorophyll/ USA, Mississippi R./ USA, Louisiana, Mississippi Delta/ ecosystems and energetics/ sediments and sedimentation/ characteristics, behavior and fate/ water/ freshwater pollution/ water pollution: monitoring, control & remediation

*Abstract:* The objectives of this study were: (1) to carry out a baseline study of water quality parameters in the Maurepas forested wetland in Louisiana, USA; and (2) to estimate potential nitrate uptake of a proposed Mississippi River diversion into the wetland. Water sampling trips were carried out monthly from April to October 2000. Average water quality parameter concentrations and ranges were: nitrate 0.008 mg-N l super(-1) (non-detectable (n.d)-0.143 mg-N l super(-1)); ammonium 0.007 mg-N l super(-1) (n.d.-0.048 mg-N l super(-1)); total nitrogen 0.577 mg-N l super(-1) (0.193-1.285 mg-N l super(-1)); phosphate 0.034 mg-P l super(-1) (n.d.-0.369 mg-P l super(-1)); total phosphorus 0.055 mg-P l super(-1) (0.022-0.424 mg-P l super(-1)); total suspended sediment 16 mg l super(-1) (4-101 mg l super(-1)),

salinity 3 (0-12), and chlorophyll a 11 mu g l super(-1) (1-31 mu g l super(-1)). A UNET hydrodynamic model was constructed to predict hydrologic patterns as diverted water flowed through the Maurepas swamp. The study area was divided into 53 storage cells based on topographical features that mostly consisted of natural bayous and degraded artificial levees. Nitrate loading was high in the initial cells and removal efficiencies were on the order of 40-70%. Loading in subsequent cells was much lower and simulated nitrate retention was greater than 90%. Since most nutrients will be retained in the swamp, the proposed diversion of Mississippi River water should not cause adverse water quality conditions or extreme or persistent algal blooms in the Lake Maurepas.

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**962. Reforestation of Frequently Flooded Agricultural Fields: A Compendium of Results from Research Conducted at the Lake George Wetland and Wildlife Restoration Project, Mississippi.**

Williams, H. M.; Craft, M. H.; and Young, G. L.

Vicksburg, MS.: Army Engineer Waterways Experiment Station; WES/TR/WRP-RE-18, 1997.

*Notes:* NTIS accession number: ADA3311321

*Descriptors:* wetlands/ flood plains/ agriculture/ land use/ reclamation/ ecosystem management/ environment management/ plant populations/ vegetation cover/ habitat/ USA, Mississippi, George L./ bottomland hardwood reforestation/ habitat community studies/ conservation, wildlife management and recreation

*Abstract:* The objective of the Lake George Bottomland Hardwood Wildlife and Wetland Restoration Project is to restore functioning bottomland hardwood wetland habitat by reforesting 3,600 ha of agricultural fields located in the Mississippi Delta. The Lake George Project provided an opportunity to conduct applied research on several bottomland hardwood reforestation topics. University and Federal agency scientists conducted studies on matching tree species to the site, selecting plant stock type, selecting when to plant, and monitoring early habitat development following planting.

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**963. Removal of solids, nitrogen, and phosphorus in the Cache River wetland.**

Dortch, Marks S.

*Wetlands* 16(3): 358-365. (1996)

NAL Call #: QH75.A1W47; ISSN: 0277-5212

*Descriptors:* biochemistry and molecular biophysics/ forestry/ freshwater ecology: ecology, environmental sciences/ black swamp/ bottomland hardwood forest/ Cache River/ field method/ forested wetlands/ freshwater ecology/ inorganic suspended solids/ mass flux measurement/ mathematical model/ nitrogen/ phosphorus/ removal efficiency

*Abstract:* Mass flux measurements collected between April 1987 and September 1990 at the upstream and downstream boundaries of the Cache River Wetland (CRW), a bottomland hardwood forest in eastern Arkansas, were used to estimate long-term, average removal efficiencies (RE, %) for inorganic suspended solids (ISS), total nitrogen (TN), and total phosphorus (TP). The observed removal efficiencies were used with a steady-state, first-order removal model to compute removal rate constants. Detention time of the CRW was determined with

a time-varying, two-dimensional, depth-averaged, numerical flow and transport model. The computed average detention time of 5.02 da was close to the average hydraulic retention time of 5.15 da, justifying the plug flow assumption of the model. The removal rate constants estimated from the CRW data for ISS, TN, and TP were 0.066 m/da, 0.048 da<sup>-1</sup>, and 0.0058 m/da (2.1 m/yr), respectively. The denitrification rate constant estimated for the CRW was 0.24 da<sup>-1</sup>. These rate constants are in general agreement with values obtained from the literature.  
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**964. Restoration of bottomland hardwood forests in the lower Mississippi Valley.**

Newling, Charles J.

*Restoration and Management Notes* 8(1): 23-28. (1990)

NAL Call #: QH76.R47; ISSN: 0733-0707

*Descriptors:* ecological restoration/ land restoration/ lowland forests

**965. Shorebird use of managed wetlands in the Mississippi Alluvial Valley.**

Twedt, D. J.; Nelms, C. O.; Rettig, V. E.; and Aycock, S. R.

*American Midland Naturalist* 140(1): 140-152. (1998)

NAL Call #: 410 M58; ISSN: 0003-0031

*Descriptors:* wetlands/ habitat utilization/ agricultural land/ wildlife management/ aquatic birds/ artificial substrata/ population density/ migratory species/ ecosystem management/ birds/ land management/ environmental protection/ habitats/ Aves/ Charadrius vociferus/ Gallinago gallinago/ USA, Mississippi R./ USA/ birds/ killdeer/ common snipe

*Abstract:* We assessed shorebird use of artificial wetlands within the Mississippi Alluvial Valley during the winters of 1991-1992 and 1992-1993 and during the autumn of 1994. On agricultural fields managed to provide habitat for waterfowl from November to March, mean shorebird density was 58.6 birds/100 ha, but shorebird densities were greater on soybean fields than on rice or moist-soil fields. Killdeer (*Charadrius vociferus*) and common snipe (*Gallinago gallinago*) were common throughout winter, but shorebird abundance and species richness along survey routes increased from November through April. During the late summer and autumn, wetlands on public lands in the Mississippi Alluvial Valley are managed by the U.S. Fish and Wildlife Service specifically to provide foraging habitat for shorebirds. From August through October 1994, we observed 14,564 individual shorebirds of 22 species using these anthropogenic wetlands. Mean shorebird density on wetlands managed by flooding previously dry, disked fields was 695 birds/100 ha, whereas mean density on wetlands managed by drawing down water reservoirs was 1224 birds/100 ha. We recommend increased shallow-water flooding of agricultural fields, particularly soybean fields, during winter to provide habitat for wintering and early spring migrant shorebirds. More importantly, we recommend continued water management on public wetlands from July through October, preferably by drawing down water reservoirs, to provide foraging habitat for southward migrating shorebirds.

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**966. Soil, hydroperiod and bedding effects on restoring bottomland hardwoods on flood-prone agricultural lands in North Louisiana, USA.**

Patterson, William B. and Adams, John C.

*Forestry* 76(2): 181-188. (2003)

NAL Call #: 99.8 F767; ISSN: 0015-752X

*Descriptors:* artificial regeneration: applied and field techniques/ site preparation method: applied and field techniques/ afforestation/ bottomland hardwood site restoration: bedding effects, hydroperiod effects, soil effects/ flood prone agricultural lands/ seasonality/ soil properties

*Abstract:* Many of the bottomland hardwood forests of the Lower Mississippi Alluvial Valley, USA have been converted to agriculture, thus constituting a sizable loss in ecological and socio-economic functions. Bottomland hardwood forest afforestation on marginal agricultural lands has grown considerably since 1990. However, many failures in bottomland hardwood afforestation have occurred for various reasons, including misunderstandings or ignoring the relationships between species, soil and hydrology. In October 1996, a 32-ha tract on an abandoned agricultural field in Catahoula Parish, Louisiana, USA was site prepared for afforestation by bedding (moulding soil in parallel ridges). The following January it was planted with seedlings of Nuttall oak (*Quercus nuttallii* Palmer) and green ash (*Fraxinus pennsylvanica* Marsh.), and direct seeded with Nuttall oak. The objective of this study was to evaluate the effects of bedding (within three soil types) on species survival and growth. Soil redox potential measurements indicated that the soils were intensely anaerobic during frequent prolonged seasonal inundation and saturation events. Bedding clayey soils significantly increased mean height of planted and direct-seeded Nuttall oak, but not that for green ash. Bedding appears to be somewhat effective in restoring site microtopography, reducing soil hydroperiod and enhancing planted Nuttall oak height growth on poorly drained, clayey soils.

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**967. Soil seed banks and the potential restoration of forested wetlands after farming.**

Middleton, B. A.

*Journal of Applied Ecology* 40(6): 1025-1034. (2003)

NAL Call #: 410 J828; ISSN: 0021-8901

*Descriptors:* baldcypress swamp/ flood pulsing/ regeneration dynamics/ seed dispersal/ seed longevity/ self-design theory/ *Taxodium distichum*/ weed ecology

*Abstract:* 1. Changes in farming practice provide an opportunity to restore once extensive forested wetlands on agricultural land. In some parts of the world, however, it has proved difficult to restore the full complement of plant species through natural regeneration. Similarly, the restoration of forested wetlands by replanting has often resulted in ecosystems of low diversity. Better methods of restoring these important ecosystems are now required and baldcypress swamps provide an opportunity to investigate alternative approaches to the restoration of forested wetlands. This study examined the composition of seed banks of farmed fields to determine their value in restoring swamps in the south-eastern United States. 2. A seed bank assay of soils from baldcypress swamps was conducted to determine the extent to which seeds are maintained during farming for various lengths of time. Soils from swamps that were farmed for 0-50 years were collected near the

northern boundary of the Mississippi Alluvial Valley along the Cache River, Illinois. Soils were placed in a glasshouse setting in flooded and freely drained conditions, and the numbers and species of seeds germinating were recorded. 3. Woody species including trees, shrubs, and vines were poorly represented in seed banks of both farmed and intact sites (51 and 9 sites, respectively). Missing dominants in the seed banks included tree species with short-lived seeds such as *Taxodium distichum* and *Nyssa aquatica*. *Cephalanthus occidentalis* constituted the most abundantly dispersed seed of all woody species. 4. Herbaceous species were well represented in the seed banks of both farmed and intact swamps (species richness of 207 vs. 173 species, respectively) suggesting that herbaceous species may live longer than woody species in seed banks. Few of the herbaceous species decreased in seed density in seed banks with time under cultivation, although seed density was lower at sites that had not been farmed. Species that relied on vegetative organs for dispersal were absent in the seed banks of farmed sites including *Heteranthera dubia*, *Hottonia inflata*, *Lemna minor*, *Lemna trisulca* and *Wolffia columbiana*. These species may require active reintroduction during restoration. 5. Synthesis and applications. Both restoration ecologists and managers of nature conservation areas need to be cognizant of seed bank and dispersal characteristics of species to effectively restore and manage forested wetlands. In the case of baldcypress swamps, critical components of the vegetation are not maintained in seed banks, which may make these floodplain wetlands difficult to restore via natural recolonization. Ultimately, the successful restoration of abandoned farm fields to forested wetlands may depend on the re-engineering of flood pulsing across landscapes to reconnect dispersal pathways.  
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**968. Stand development on reforested bottomlands in the Mississippi Alluvial Valley.**

Twedt, Daniel J.

*Plant Ecology* 172(2): 251-263. (2004)

NAL Call #: QK900.P63; ISSN: 1385-0237

*Descriptors:* cluster analysis: mathematical and computer techniques/ reforested bottomlands: natural regeneration, planting, stand development

*Abstract:* Reforestation of bottomland hardwood sites in the southeastern United States has markedly increased in recent years due, in part, to financial incentives provided by conservation programs. Currently > 250,000 ha of marginal farmland have been returned to hardwood forests. I observed establishment of trees and shrubs on 205 reforested bottomlands: 133 sites were planted primarily with oak species (*Quercus* spp.), 60 sites were planted with pulpwood producing species (*Populus deltoides*, *Liquidambar styraciflua*, or *Platanus occidentalis*), and 12 sites were not planted (i.e., passive regeneration). Although oak sites were planted with more species, sites planted with pulpwood species were more rapidly colonized by additional species. The density of naturally colonizing species exceeded that of planted species but density of invaders decreased rapidly with distance from forest edge. Trees were shorter in height on sites planted with oaks than on sites planted with pulpwood species but within a site, planted trees attained greater heights than did colonizing species. Thus, planted trees dominated the canopy of reforested sites as they matured. Planted species acted in concert with natural invasion to influence the current condition of woody vegetation on reforested sites. Cluster analysis of species importance values distinguished three woody vegetation conditions: (1) *Populus deltoides* stands (2) oak stands with little natural invasion by other tree species, and (3) stands dominated by planted or naturally invading species other than oaks. Increased diversity on reforested sites would likely result from (a) greater diversity of planted species, particularly when sites are far from existing forest edges and (b) thinning of planted trees as they attain closed canopies.

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