

Wetlands in Multiple CEAP Wetlands Assessment Regions

General Information

1107. Analysis of wetland trends and management alternatives for Georgia.

Woolf, S. W. and Kundell, J. E.

Atlanta: Environmental Resources Center, Georgia Institute of Technology; Report No. Erc 01-85, 1985. 154 p.

Descriptors: wetlands/ coastal marshes/ Georgia/ land use/ salt marshes/ alternative planning/ drainage/ erosion/ estuaries/ flood control/ forest management/ marshes/ soils/ urban runoff/ vegetation/ water management/ waterfowl

Abstract: Georgia is experiencing 'Sunbelt' population growth and expansions in agricultural and forestry production resulting in increased pressure to convert wetlands to other uses. An analysis was undertaken of data generated by the Fish & Wildlife Service's National Wetland Inventory, Georgia Department of Natural Resource's Landsat Land use study, and Soil Conservation Service's National Resources Inventory. Wetland acreage, distribution, types, and trends were identified for Georgia. A review of case law and statutory law was conducted and wetland management activities of federal, state, and local governments were determined. Alternative management strategies were identified for Georgia.

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1108. Bayous of the northern Gulf of Mexico: Distribution and trophic ecology of invertebrates.

Gaston, Gary R.

In: Invertebrates in freshwater wetlands of North America: Ecology and management/ Batzer, Darold P.; Rader,

Russell B.; and Wissinger, Scott A.

New York: John Wiley & Sons, 1999; pp. 919-947.

Notes: ISBN: 0471292583

NAL Call #: QL365.4.A1158

Descriptors: Invertebrata/ ecology/ functional ecology of bayous streams/ trophic structure/ population density/ bayous streams/ brackish habitat/ USA/ Gulf of Mexico, north coast/ bayous streams functional ecology

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1109. Changes in piping plover nesting habitat availability at Great Plains alkaline wetlands, 1938-1997.

Root, Brian G. and Ryan, Mark R.

Wetlands 24(4): 766-776. (2004)

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

Descriptors: alkaline wetland/ fire frequency/ flooding impact/ ground water hydrology/ livestock grazing intensity/ long term recovery/ nesting habitat availability/ surface water level/ total beach habitat/ vegetation encroachment

Abstract: Alkaline wetland beaches provide crucial habitat for breeding piping plovers (*Charadrius melodus*) in the northern Great Plains of the United States and Canada. Vegetation encroachment has been identified as a potential threat that decreases alkaline beach habitat availability, but the long-term status of these breeding habitats has not been evaluated. We measured vegetation changes at two North Dakota alkaline wetland complexes from 1938 to 1997. Total beach habitat, including lower beaches that were impacted by flooding, varied substantially among years based on changes in surface-water levels. Quantities

of upper-beach habitats, which were not affected by inundation, were negatively correlated with precipitation amounts during the previous five-year periods. We measured declines in upper-beach habitat averaging 0.89 ha/yr and 0.20ha/yr at our two wetland complexes from 1938 to 1997, suggesting that long-term changes in factors other than precipitation (e.g., ground-water hydrology, livestock grazing intensity, or fire frequency) may be negatively affecting beach availability. Vegetation reduction may be critical to long-term recovery of threatened piping plovers in the Great Plains.

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1110. Characteristics of wetland habitats and waterfowl populations in Oklahoma.

Heitmeyer, Mickey E. / Oklahoma State University, 1980.

Notes: Thesis (M.S.)

NAL Call #: QH87.3.H45 1980

Descriptors: wetlands, Oklahoma/ waterfowl, Oklahoma

This citation is from AGRICOLA.

1111. Climate change, hurricanes and tropical storms, and rising sea level in coastal wetlands.

Michener, W. K.; Blood, E. R.; Bildstein, K. L.;

Brinson, M. M.; and Gardner, L. R.

Ecological Applications 7(3): 770-801. (1997)

NAL Call #: QH540.E23; *ISSN:* 1051-0761

Descriptors: climate change/ coastal wetlands in southeastern United States/ colonial waterbirds and hurricanes/ comparative studies, conceptual models of hurricanes/ moisture-continuum model/ sea level rise/ space-for-time substitution/ tropical storms

Abstract: Global climate change is expected to affect temperature and precipitation patterns, oceanic and atmospheric circulation, rate of rising sea level, and the frequency, intensity, timing, and distribution of hurricanes and tropical storms. The magnitude of these projected physical changes and their subsequent impacts on coastal wetlands will vary regionally. Coastal wetlands in the southeastern United States have naturally evolved under a regime of rising sea level and specific patterns of hurricane frequency, intensity, and timing. A review of known ecological effects of tropical storms and hurricanes indicates that storm timing, frequency, and intensity can alter coastal wetland hydrology, geomorphology, biotic structure, energetics, and nutrient cycling. Research conducted to examine the impacts of Hurricane Hugo on colonial waterbirds highlights the importance of longterm studies for identifying complex interactions that may otherwise be dismissed as stochastic processes. Rising sea level and even modest changes in the frequency, intensity, timing, and distribution of tropical storms and hurricanes are expected to have substantial impacts on coastal wetland patterns and processes. Persistence of coastal wetlands will be determined by the interactions of climate and anthropogenic effects, especially how humans respond to rising sea level and how further human encroachment on coastal wetlands affects resource exploitation, pollution, and water use. Long-term changes in the frequency, intensity, timing, and distribution of hurricanes and tropical storms will likely affect biotic

functions (e.g., community structure, natural selection, extinction rates, and biodiversity) as well as underlying processes such as nutrient cycling and primary and secondary productivity. Reliable predictions of global-change impacts on coastal wetlands will require better understanding of the linkages among terrestrial, aquatic, wetland, atmospheric, oceanic, and human components. Developing this comprehensive understanding of the ecological ramifications of global change will necessitate close coordination among scientists from multiple disciplines and a balanced mixture of appropriate scientific approaches. For example, insights may be gained through the careful design and implementation of broad-scale comparative studies that incorporate salient patterns and processes, including treatment of anthropogenic influences. Well-designed, broad-scale comparative studies could serve as the scientific framework for developing relevant and focused long-term ecological research, monitoring programs, experiments, and modeling studies. Two conceptual models of broad-scale comparative research for assessing ecological responses to climate change are presented: utilizing space-for-time substitution coupled with long-term studies to assess impacts of rising sea level and disturbance on coastal wetlands, and utilizing the moisture-continuum model for assessing the effects of global change and associated shifts in moisture regimes on wetland ecosystems. Increased understanding of climate change will require concerted scientific efforts aimed at facilitating interdisciplinary research, enhancing data and information management, and developing new funding strategies.
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1112. Colonization of restored wetlands by amphibians in Minnesota.

Lehtinen, Richard M. and Galatowitsch, Susan M.
American Midland Naturalist 145(2): 388-396. (2001)
NAL Call #: 410 M58; ISSN: 0003-0031
Descriptors: aquatic vegetation cover/ colonization/ habitat suitability/ restored wetlands/ water chemistry
Abstract: Twelve wetlands (7 recently restored; 5 reference) in central and southern Minnesota were monitored during the 1998 breeding season to assess colonization of recently restored wetlands by amphibians, compare the amphibian fauna to that of reference wetlands and identify important factors influencing the probability of colonization. Eight amphibian species rapidly colonized recently restored wetlands and established breeding populations. Reference wetlands were inhabited by twelve species, including four not found in restored wetlands (*Ambystoma laterale*, *Notophthalmus viridescens*, *Pseudacris crucifer* and *Rana clamitans*). Most local habitat variables, such as water chemistry or aquatic vegetation cover, were not influential in determining species richness patterns in recently restored wetlands. Size and spatial isolation of restored wetlands, however, were important predictors of species richness. Habitat suitability also influenced the probability of colonization for some species. The results of this study indicate that restored wetlands are valuable habitat for at least a subset of the amphibian fauna of this region and that wetland size, isolation and habitat suitability all influence colonization success.
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1113. A comparison of the watershed hydrology of coastal forested wetlands and the mountainous uplands in the Southern US.

Sun, G.; McNulty, S. G.; Amatya, D. M.; Skaggs, R. W.; Swift, L. W.; Shepard, J. P.; and Riekerk, H.
Journal of Hydrology 263(1-4): 92-104. (2002)
NAL Call #: 292.8 J82; ISSN: 0022-1694
http://www.srs.fs.usda.gov/pubs/ja/ja_sun002.pdf
Descriptors: USA, Southeast/ catchment areas/ watersheds/ hydrology/ streamflow comparison/ studies/ forests/ climatology/ topography/ regional analysis/ stream flow/ comparative studies/ forest hydrology/ wetlands development/ hydrologic data/ long-term changes/ seasonal variations/ runoff/ storms/ climate/ USA, Southeast
Abstract: Hydrology plays a critical role in wetland development and ecosystem structure and functions. Hydrologic responses to forest management and climate change are diverse in the Southern United States due to topographic and climatic differences. This paper presents a comparison study on long-term hydrologic characteristics (long-term seasonal runoff patterns, water balances, storm flow patterns) of three watersheds in the southern US. These three watersheds represent three types of forest ecosystems commonly found in the lower Atlantic coastal plain and the Appalachian upland mountains. Compared to the warm, flat, and shallow groundwater dominated pine flatwoods on the coast, the inland upland watershed was found to have significantly higher water yield, Precipitation/Hamon's potential evapotranspiration ratio (1.9 for upland vs 1.4 and 0.9 for wetlands), and runoff/precipitation ratio (0.53 plus or minus 0.092 for upland vs 0.30 plus or minus 0.079 and 0.13 plus or minus 0.094 for wetlands). Streamflow from flatwoods watersheds generally are discontinuous most of the years while the upland watershed showed continuous flows in most years. Stormflow peaks in a cypress-pine flatwoods system were smaller than that in the upland watershed for most cases, but exceptions occurred under extreme wet conditions. Our study concludes that climate is the most important factor in determining the watershed water balances in the southern US. Topography effects streamflow patterns and stormflow peaks and volume, and is the key to wetland development in the southern US.
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1114. Conserving Southeastern coastal wetlands.

Southworth, A. D.
Audubon Wildlife Report 1989/1990: 223-257. (1989)
NAL Call #: QL84.2.A8; ISSN: 0885-6044
Abstract: Introduces the problems of general wetland loss in the USA, emphasizing the status of Southeastern coastal wetlands. Acreage statistics are included, with a summary of wetland losses, the causes of such loss, and the impact on fish and wildlife. Federal regulatory programmes are described, including the Clean Water Act. State regulatory programmes include wetland regulations in North Carolina, Florida, Louisiana and Texas. Non-regulatory programmes like Coastal Zone Management Acts, Coastal Barrier Resources Acts, acquisition programmes and State planning programmes are considered, as are restoration and management efforts. -S.J.Yates
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1115. Constructed wetlands for wastewater treatment: Municipal, industrial and agricultural.

In: Proceedings from the First International Conference on Constructed Wetlands for Wastewater Treatment . (Held 13 Jun 1988-17 Jun 1988 at Chattanooga, Tennessee.)
Hammer, Donald A. (eds.)

Chelsea, Michigan: Lewis Publishers; 831 p.; 1989.

NAL Call #: TD756.5.C66

Descriptors: wetlands/ land disposal/ conferences/ wastewater treatment/ artificial wetlands/ biological wastewater treatment/ water pollution control/ macrophytes/ municipal wastewater/ industrial wastewater/ agricultural wastewater/ tennessee/ wastewater treatment processes/ ultimate disposal of wastes/ lakes

Abstract: Widespread use of constructed wetlands may provide a relatively simple and inexpensive solution for controlling many water pollution problems facing small communities, industries, and agricultural operations. Adoption of this technology has been inhibited by a lack of guidelines and instructions supported by adequate information on important system components and basic wetlands ecology. The goal of the present volume is to provide information to improve acceptance and increase application of constructed wetlands for water quality improvements. The book represents the proceedings of the First International Conference on Constructed Wetlands for Wastewater Treatment, held at Chattanooga, Tennessee, on 13-17 June 1988. Besides wetlands treatment of municipal wastewater, which has been the subject of other conferences, this volume includes applications with acid mine drainage, urban runoff, agricultural wastes, and industrial effluents. Topics include: general principles (hydrology, chemistry, physics, ecology, and microbiology); case histories (pilot and full-scale plants); design, construction, and operation; and recent results from field and laboratory (dynamics of inorganic and organic materials in wetlands, efficiencies of substrates, vegetation, water levels, and microbial populations, management of domestic and municipal wastewaters, nonpoint source pollutants (urban runoff and agricultural wastes), applications to industrial and landfill wastewaters, and control of acid mine drainage including coal pile and ash pond seepage).

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1116. Creation and restoration of coastal plain wetlands in Florida.

Lewis, R. R.

In: Wetland Creation and Restoration: The Status of the Science.

Covelo, Calif.: Island Press, 1990; pp. 73-101.

Notes: ISBN: 1559630450

NAL Call #: QH541.5.M3W462

Descriptors: artificial wetlands/ Florida/ tidal marshes/ water resources management/ wetland restoration/ drainage engineering/ environmental impact/ habitat restoration/ mangrove swamps/ plant populations/ planting management/ tidal effects/ vegetation establishment/ water resources development

Abstract: Despite hundreds of mangrove and tidal marsh restoration and creation efforts in Florida over the last fifteen years, current efforts are largely more art than science. Adequate monitoring and reporting are rare, and no institutional memory exists to improve the review and monitoring process. An overview of the Floridian region is

given, followed by discussions of the extent to which creation/restoration has occurred, the design of creation/restoration projects, monitoring, and information gaps and research needs. Appendices include recommended reading, a list of project profiles, and a permit review checklist for Florida coastal wetlands. Based on a critical review of actual projects and the sparse literature, five factors appear most important to successful wetland establishment; these are: (1) correct elevations for the target plant species; (2) adequate drainage provided by gradual slopes and sufficient tidal connections; (3) appropriate site selection to avoid wave damage; (4) appropriate plant materials; and (5) protection from human impacts.

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1117. Creation and restoration of forested wetland vegetation in the southeastern USA.

Clewell, A. F. and Lea, R.

In: Wetland Creation and Restoration: The Status of the Science/ Kusler, J. A. and Kentual, M. E.

Island Press: Washington, D.C., 1990; pp. 195-232

NAL Call #: QH541.5.M3W462

Descriptors: conservation/ ecology: environmental sciences/ estuarine ecology: ecology, environmental sciences/ forestry/ pest assessment control and management/ soil science/ wildlife management: conservation/ animal marsh vs. forest replacement/ hydrology substrate/ soil fertility wetland type/ ecological function/ herbivore control/ weed control/ mine reclamation/ water management/ revegetation/ biomonitoring/ Kentucky/ South Carolina/ Florida/ Louisiana/ Arkansas/ Virginia/ North Carolina/ Tennessee/ Georgia

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1118. Development of Ohio's GIS-based wetlands inventory.

Yi, Gi-Chul; Risley, D.; Koneff, M.; and Davis, C.

Journal of Soil and Water Conservation 49(1): 23-28. (1994)

NAL Call #: 56.8 J822; ISSN: 0022-4561

Descriptors: wetlands/ mapping/ inventories/ environmental protection/ classification/ geographic information systems/ USA, Ohio/ GIS/ geographic information systems/ inventories/ classification/ conservation, wildlife management and recreation/ environmental action/ network design

Abstract: Of Ohio's original 26.4 million acres, more than five million are classified as hydric soils or having hydric inclusions, a condition indicative of wetlands. Today, about 800,000 acres, less than 20 percent of the historical wetlands, remain unaltered. Ohio's legacy of wetland degradation reflects the national trend with respect to inland wetland losses attributable to agricultural, residential, and commercial development as well as other uses. Today, the state's remaining wetlands are threatened by such activities as land development, draining, land-filling, conversion to agriculture, and highway construction. The threats to wetlands are varied and complex. While pressures to convert wetlands mount, there is a growing public awareness of the value of wetlands. State-of-the-art mapping systems, Geographic Information Systems (GIS), were used in the creation of the Ohio Wetland Inventory. GISs are computer hardware and software configurations specifically designed to manipulate, interpret, and manage

large spatially referenced data bases. These systems can be successfully applied to the integration of natural, cultural, social, and economic information and utilized as interactive spatial data processing systems.
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1119. Ecological relationships between landscape change and plant guilds in depressional wetlands.

Lopez, Ricardo D.; Davis, Craig B.; and Fennessy, M. Siobhan

Landscape Ecology 17(2): 43-56. (2002)

NAL Call #: QH541.15.L35 L36; ISSN: 0921-2973

Descriptors: ecology: environmental sciences/ freshwater ecology: ecology, environmental sciences/ nested quadrat sampling/ field method, sampling method/ depressional wetlands/ ecological relationships: landscape change, plant guilds/ land cover type: cropland, forest, grassland, open water, urban land

Abstract: We used plant guilds to measure the relationships between wetland plant community characteristics and landscape change around 31 depressional wetlands in central Ohio, USA. Characteristics of certain plant guilds within each wetland site are correlated with changes in: (a) area of urban land cover, forest, grassland, agriculture, and open-water in the local vicinity of the wetland; (b) inter-wetland distance; and (c) wetland size (area). Taxa richness is negatively correlated with inter-wetland distance for all plant guilds, except submersed herbaceous plants. Taxa richness of the submersed herbaceous plant guild (usually less than 20% of the total number of plant species at a wetland) is positively correlated with the area of open-water in the local landscape and with the area of the wetland site itself. Significant positive correlations also exist between the area of open-water in the vicinity of the wetland and the proportion of submersed herbaceous plant taxa at the site, the number of native submersed herbaceous plant species, the submersed herbaceous plant perennial-to-annual ratio, and the number of avian-dispersed submersed herbaceous plant species at a site. The results suggest that (a) the dominance of submersed herbaceous plant species at a site is related to dispersal constraints between wetlands, and (b) the relatively slower physiological response of woody plants to local landscape change may result in their contribution to greater 'ecological inertia' in the plant community as a whole. For these reasons, relationships between the plant community and land cover change may not always be observed unless analyzed at the level of plant-guild.

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1120. Ecosystem dynamics of protists and bacteria in a lotic wetland ecosystem.

Johnson, M. D.

Tuscaloosa, AL: University of Alabama at Tualoosa, 1995.

Descriptors: wetlands/ abundance/ bacteria/ biomass/ ciliates/ ecosystem dynamics/ organic carbon/ protists/ seasonal changes/ ecology/ bacteria/ fungi/ viruses/ North America/ United States/ Insertae/ Sedis/ Ophrydium versatile

Abstract: Despite their importance, little information is available on the ecology of protists and bacteria in freshwater wetland ecosystems. Microbial communities were compared monthly at eight sites in a lotic wetland within the coastal plain region of the southeastern United

States, from upstream, through an alder swamp, reed marsh, and water lily pond, to a downstream site. Protist abundances and biomass, and bacterial abundances, biomass, and productivity were all generally greater in the wetland habitats compared to up stream and downstream sites, especially in summer. Among wetland habitats, planktonic microbial populations were most productive in the reed marsh and among submerged aquatic plants, and lowest in the alder swamp. The planktonic microbial communities were primarily heterotrophic. Dissolved organic carbon (DOC) derived from aquatic plant community production during summer in the wetland pond stimulated planktonic bacterial production, which served as a primary food source for protozoa. The wetland habitats affected the lotic system as a whole by substantially increasing the amount of microbial biomass transported downstream. In the wetland pond, DOC concentrations, bacterial abundance and productivity, and protist abundance were more than an order of magnitude higher during warm months than cool months. Out-of-phase oscillations between microbial populations suggested protist grazing pressure strongly affected bacterial abundance during the warm months. Experiments using natural microbial communities showed similar uptake rates of macrophyte leachate by both grazed and un grazed bacteria. However, in the plankton, grazing of bacteria by nanoflagellates resulted in greatly increased rates of carbon mineralization to carbon dioxide (CO₂) rather than making this carbon available to other trophic levels. Ophrydium versatile, a mixotrophic, colonial ciliate was studied to determine seasonal changes in its distribution, primary productivity, and rates of bacterivory. Summer rates of primary production and bacterial consumption were higher than any other season on the basis of colony surface area. However, high bacterial productivity and limited ciliate distribution diminished their importance to the pond ecosystem in summer. During the winter, these ciliates functioned primarily as bacterivores, and low planktonic bacterial productivity combined with a wide distribution of large ciliate colonies made O. versatile capable of clearing up to one-third of the water column of bacterial production daily.

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1121. Environmental characteristics of Oklahoma wetlands.

Heitmeyer, Mickey E. and Vohs, Paul A.

Stillwater, Okla.: Oklahoma State University; Series: Environment series 5; 141 p. (1981)

NAL Call #: QH541.5.M3H4

Descriptors: wetlands Oklahoma/ wetland ecology Oklahoma

This citation is from AGRICOLA.

1122. Evaluating regional differences in macroinvertebrate communities from forested depressional wetlands across eastern and central North America.

Batzer, Darold P.; Dietz Brantley, Susan E.; Taylor, Barbara E.; and DeBiase, Adrienne E.

Journal of the North American Benthological Society 24(2): 403-414. (June 2005)

NAL Call #: QL141.F7; ISSN: 0887-3593

Descriptors: Macroinvertebrata/ community structure/ forested depressional wetland habitats/ semiaquatic

habitat/ forested depressional wetlands/ community structures/ North America, central and eastern/ forested depressional wetland habitat community structures/ regional differences

Abstract: Forested depressional wetlands are an important seasonal wetland type across eastern and central North America. Macroinvertebrates are crucial ecosystem components of most forested depressional wetlands, but community compositions can vary widely across the region. We evaluated variation in macroinvertebrate faunas across eastern and central North America using 5 published taxa lists from forested depressional wetlands in Michigan, Ontario, Wisconsin, Florida, and Georgia. We supplemented those data with quantitative community descriptions generated from 17 forested depressional wetlands in South Carolina and 74 of these wetlands in Minnesota. Cluster analysis of presence/absence data from these 7 locations indicated that distinct macroinvertebrate communities existed in northern and southern areas. Taxa characteristic of northern forested depressional wetlands included Sphaeriidae, Lumbriculidae, Lymnaeidae, Physidae, Limnephilidae, Chirocephalidae, and Hirudinea (Glossophoniidae and/or Erpobellidae) and taxa characteristic of southern sites included Asellidae, Crangonyctidae, Noteridae, and Cambaridae. Quantitative sampling in South Carolina and Minnesota indicated that regionally characteristic taxa included some of the most abundant organisms, with Sphaeriidae being the 2nd most abundant macroinvertebrate in Minnesota wetlands and Asellidae being the 2nd most abundant macroinvertebrate in South Carolina wetlands. Mollusks, in general, were restricted to forested depressional wetlands of northern latitudes, a pattern that may reflect a lack of Ca needed for shell formation in acidic southern sites. Differences in community composition probably translate into region-specific differences in the ecological functions performed by macroinvertebrates in forested depressional wetlands.
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1123. Forested wetland area and distribution: A detailed look at the South.

Cubbage, F. W. and Flather, C. H.

Journal of Forestry 91(5): 35-39. (1993)

NAL Call #: 99.8 F768; ISSN: 0022-1201

Descriptors: wetlands/ watershed management/ forestry/ protection/ federal jurisdiction/ regulations/ distribution/ environmental protection/ classification systems/ ecosystem management/ environment management/ geographical distribution/ USA, Southeast/ watershed management/ forestry/ federal jurisdiction/ regulations/ watershed protection/ conservation, wildlife management and recreation

Abstract: Debate over the classification, protection, and management of forested wetlands has intensified in recent years. Federal agencies have classified US wetlands in various manners, leading to frequent protests by groups favoring more or less stringent criteria. In addition, wetland issues have faced an evolving scope of federal water pollution laws applying to wetland regulation; a unified federal wetland delineation manual whose implementation was opposed by the executive branch and some members of Congress; and introduction of bills to redefine wetlands. Despite continuing debate, there is still no single definition of wetlands, and very little information is available on their actual area and distribution in the United States, especially

forested wetlands. In fact, published estimates of forest wetland acreage have varied widely, increasing confusion about the implications of permit requirements of management restrictions. More reliable data on forested wetland extent and trends can clarify our knowledge and contribute to future discussions. Accordingly, this article summarizes the latest data on the acreage and regional distribution of forested wetlands in the United States. Since almost two-thirds are in the South, it also examines the distribution of forest wetland types among southern subregions.

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1124. Forested wetlands of the Southeast: Review of major characteristics and role in maintaining water quality.

Winger, P. V. Fish and Wildlife Service, U.S. Department of the Interior, 1986. Resource Publication.

Abstract: The productive and ecologically diverse forested wetlands occupying the floodplains of major rivers in the US Southeast are produced and maintained by fluvial processes and periodic flooding. The shift between aerobic and anaerobic conditions in the floodplain soil in response to flooding facilitates assimilation of nutrients and organic matter, hastens degradation of persistent pesticides, and decreases the bioavailability of heavy metals. -Author
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1125. Forested wetlands of the southern United States.

Hook, Donal D. and Lea, Russ (eds.) Proceedings of the symposium. (Held 12 Jul 1988-14 Jul 1988 at Orlando, Fla.) Asheville, N.C.: United States Dept. of Agriculture Forest Service; 168 p.; 1989.

NAL Call #: aSD433.A53 no.50

http://www.srs.fs.usda.gov/pubs/gtr/gtr_se050.pdf

Descriptors: forest management--United States--congresses/ wetlands--United States--congresses/ wetland conservation--United States--congresses/ wetland ecology--United States--congresses
This citation is from AGRICOLA.

1126. Functional assessment of five wetlands constructed to mitigate wetland loss in Ohio, USA.

Wilson, R. F. and Mitsch, W. J.

Wetlands 16(4): 436-451. (1996)

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

Descriptors: wetlands/ habitat improvement/ man-induced effects/ nature conservation/ evaluation/ hydrology/ marshes/ environmental restoration/ USA, Ohio/ evaluation/ depression wetlands/ environmental restoration/ habitat improvement/ man-induced effects/ nature conservation
Abstract: Five replacement wetlands in Ohio, USA, were investigated to determine their ecological and legal success. Hydrology, soils, vegetation, wildlife, and water quality of each wetland determined their functional success. The progress of the wetlands was also compared to their legal requirements. Four of the five wetlands (80%) were in compliance with legal requirements and the same four wetlands demonstrated medium to high ecosystem success. For the four wetlands, a replacement ratio of 1.4:1 was achieved for area, and depressional wetlands were generally replaced with depressional wetlands.

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1127. The geological history of the marshes of coastal Louisiana.

Leblanc, R. J.

In: Marsh Management in Coastal Louisiana: Effects and Issues. (Held 7 Jun 1988-10 Jun 1988 at Baton Rouge, LA.) Duffy, W. G. and Clark, D. (eds.): Fish and Wildlife Service, U.S. Department of the Interior; pp. 1-27; 1989. NAL Call #: QH540.U562 no.89(22)

Abstract: Part I of this paper consists of a brief description of the deltaic plain complex. Part II is concerned with the description of the coastal bays, sounds, transgressive barrier islands and offshore shoals which are related to the delta complex. Part III discusses 51 significant papers on the delta complex which have been written during the past 58 years. Part IV is a brief summary of the origin and development of the coastal region of southeast Louisiana based upon the research outlined above. -from Author © 2006 Elsevier B.V. All rights reserved.

1128. The hydrogeomorphic approach to functional assessment of riparian wetlands: Evaluating impacts and mitigation on river floodplains in the USA.

Hauer, F. Richard and Smith, R. Daniel
Freshwater Biology 40(3): 517-530. (1998)

Descriptors: conservation/ freshwater ecology: ecology, environmental sciences/ hydrogeomorphic classification/ assessment method/ bottomland hardwood forest/ compensatory mitigation/ functional assessment/ human impact/ riparian wetlands/ river floodplains

Abstract: 1. The 'hydrogeomorphic' approach to functional assessment of wetlands (HGM) was developed as a synthetic mechanism for compensatory mitigation of wetlands lost or damaged by human activities. The HGM approach is based on: (a) classification of wetlands by geomorphic origin and hydrographic regime (b) assessment models that associate variables as indicators of function, and (c) comparison to reference wetlands that represent the range of conditions that may be expected in a particular region. In this paper, we apply HGM to riparian wetlands of alluvial rivers. 2. In the HGM classification, riverine wetlands are characterized by formative fluvial processes that occur mainly on flood plains. The dominant water sources are overbank flooding from the channel or subsurface hyporheic flows. Examples of riverine wetlands in the U.S.A. are: bottomland hardwood forests that typify the low gradient, fine texture substratum of the south-eastern coastal plain and the alluvial flood plains that typify the high gradient, coarse texture substratum of western montane rivers. 3. Assessment (logic) models for each of fourteen alluvial wetland functions are described. Each model is a composite of two to seven wetland variables that are independently scored in relation to a reference data set developed for alluvial rivers in the western U.S.A. Scores are summarized by a 'functional capacity index' (FCI), which is multiplied by the area of the project site to produce a dimensionless 'functional capacity unit' (FCU). When HGM is properly used, compensatory mitigation is based on the FCUs lost that must be returned to the riverine landscape under statutory authority. 4. The HGM approach also provides a framework for long-term monitoring of mitigation success or failure and, if failing, a focus on topical remediation. 5. We conclude that HGM is a robust and easy method for protecting riparian wetlands, which are critically important components of alluvial river landscapes.

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1129. Hydrologic model for design and constructed wetlands.

Arnold, J. G.; Allen, P. M.; and Morgan, D. S.
Wetlands 21(2): 167-178. (2001)

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

Descriptors: flow discharge/ model studies/ hydrology/ watersheds/ topography/ soil water plant relationships/ climatic changes/ land use/ artificial wetlands/ mathematical models/ water budget/ stream flow/ design/ soils/ topographic features/ Texas/ Trinity River/ United States

Abstract: The Trinity River Mitigation Bank was proposed to develop and use a mature, contiguous, diverse riparian corridor along the West Fork of the Trinity River near Dallas, Texas, USA. In the proposed wetland design, water would be diverted from Walker Creek as necessary to maintain wetland function. Therefore, assessment of the magnitude and continuity of the flow from Walker Creek was paramount to successful wetland operation. The Soil and Water Assessment (SWAT) model was used to assess whether the sustained flow (storm flow and base flow) from the Walker Creek Basin could maintain the proposed bottomland wetland ecosystem. For this study, SWAT was modified to allow ponded water within the prescribed wetland to interact with the soil profile and the shallow aquifer. The water budget was prepared for the wetland based on a three-step process. First, data required to run the model on Walker Creek, including soils, topographic, land-use, and daily weather data were assembled. Next, data required to validate the model were obtained. Since stream flow was not available at the proposed site, flow from a nearby watershed with similar soils, land use and topography were used. In the final step, the model was run for 14 years and compared to the measured water balance at the nearby watershed. The model results indicate that the wetland should be at or above 85 percent capacity over 60 percent of the time. The wetland did not dry up during the entire simulated time period (14 years) and reached 40 percent capacity less than one percent of the time during the simulation period. The advantages of the continuous simulation approach used in this study include (1) validation of wetland function (hydroperiod, soil water storage, plant water uptake) over a range of climatic conditions and (2) the ability to assess the long-term impact of land-use and management changes.

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1130. Hydrology, vegetation, and soils of riverine and tidal floodplain forests of the lower Suwannee River, Florida, and potential impacts of flow reductions.

Light, Helen M.; Darst, Melanie R.; and Lewis, Lori J.
Denver, CO: U.S. Geological Survey, 2002. 124 p. U.S. Geological Survey professional paper.

NAL Call #: 407 G29Pr no. 1656A

Descriptors: hydrology, forest---Suwannee River Watershed (Ga. and Fla.)/ streamflow---Suwannee River Watershed (Ga. and Fla.)/ hydrology, forest---Florida/ streamflow---Florida/ Suwannee River Watershed (Ga. and Fla.)

This citation is from AGRICOLA.

1131. Implications of environmental change for energy flow through natural systems: Freshwater wetlands and coastal zones.

Chasar, L. C.

Tallahassee, FL: Florida State University of Tallahassee, 2002.

Descriptors: carbon/ coastal zones/ energy flow/ environmental changes/ Florida Bay/ freshwater wetlands/ northern Minnesota/ coastal environments/ ecology

Abstract: Freshwater wetlands and coastal zones are complex ecosystems threatened by direct (e.g., encroachment, water/waste management) and indirect (e.g., climate change) human disturbances. My research evaluates a northern peatland and a subtropical estuary using natural abundance isotopes to trace the origin, transport and transformation of energy through these systems. This information is used in establishing current levels of functioning, comparing present to past status, and constructing models of potential responses to continually changing environmental conditions. Peat-accumulating wetlands are often characterized by their ability to store carbon. In a northern Minnesota peatland, radiocarbon and stable carbon isotope ratios of peat and of porewater dissolved organic carbon (DOC), dissolved inorganic carbon (DIC) and methane (CH₄) illustrated both temporal and spatial trends in below-ground carbon cycling:

seasonality in porewater profiles of $\delta^{13}\text{C}$ -DIC and $\delta^{13}\text{C}$ -CH₄ (representative of rate and pathway of microbial respiration) was greater in fens than bogs; radiocarbon content of peat and DOC, DIC and CH₄ indicated that recently-fixed organic matter is utilized as substrate for microbial respiration throughout the peatland, and that modern carbon is more labile in fens and non-forested Sphagnum lawns (poor fens) than bogs. Sensitivity of carbon dynamics to local vegetation and hydrology will be a dominant factor controlling the carbon storage capacity of large northern peatlands in the face of predicted climate change. In contrast, coastal ecosystems are often characterized by the types of primary production driving the system and by the dynamics of higher trophic levels. Florida Bay has been heavily impacted by the development of south Florida, and changing conditions in the bay have engendered fears that the fisheries in this system are shifting from dependence on benthic production (seagrasses) to water-column production (phytoplankton). A multiple stable isotope analysis ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$ and $\delta^{34}\text{S}$) of the bay's biota illustrates a strong dependence on benthic production such as seagrass, seagrass detritus, benthic algae and sedimentary organic matter. Long-term fish preservation experiments indicate that this multiple stable isotope approach is feasible for museum specimens (i.e. specimens that have been fixed in formalin and preserved in formalin or ethanol), allowing evaluation of trophic dynamics of current and historic populations relative to changing environmental conditions (e.g. temperature, salinity, turbidity, and seagrass distribution).

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1132. Introduction to nonpoint source pollution in the United States and prospects for wetland use.

Baker, L. A.

Ecological Engineering 1(1-2): 1-26. (1992)

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

Notes: Conference: US EPA Workshop on the Role of Created and Natural Wetlands in Controlling Nonpoint

Source Pollution, Arlington, VA (USA), 10-11 Jun 1991
Descriptors: wetlands/ reviews/ pollution sources/ pollution effects/ pollution clean-up/ water pollution/ pollution control/ wastewater treatment/ literature reviews/ agricultural pollution/ USA/ nonpoint/ nonpoint source pollution/ United States/ literature reviews/ agricultural pollution/ pollution sources/ reviews/ pollution clean-up/ pollution studies/ freshwater pollution/ characteristics, behavior and fate
Abstract: Nonpoint source (NPS) pollution is the major cause of impairment of US surface waters. The dominant source of NPS pollution is agricultural activity, and "traditional" pollutants --nutrients, sediments, and pathogens-- are the main detrimental constituents. Erosion from cropland has been declining and is expected to decline further in the 1990s, but it is unclear how this will translate into changes in sediment yields in streams. Pollution by nitrogen is of particular concern in eutrophication of estuaries, as a contaminant of groundwater and as an acidifying agent in atmospheric deposition. Nitrogen fertilizer and emissions of nitrous oxides are major contributors to the problem. The outlook on pesticides is mixed: bans on organochlorine pesticides in the 1970s have resulted in decreasing concentrations in fish tissue; however, herbicides are now a problem for some surface and groundwater sources of drinking water, especially in the Upper Midwest. Metals in NPS pollution are primarily a concern in mining areas and in urban runoff.
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1133. Macroinvertebrate responses to wetland restoration in northern New York.

Brown, S. C.; Smith, K.; and Batzer, D.

Environmental Entomology 26(5): 1016-1024. (Oct. 1997)
 NAL Call #: QL461.E532; ISSN: 0046-225X

Descriptors: wetlands/ environmental restoration/ USA, New York/ macrofauna/ man-induced effects/ environmental impact/ environment management/ habitat improvement/ colonization/ community composition/ aquatic insects/ Insecta/ soil transplantation/ aquatic entomology/ reclamation/ mechanical and natural changes/ habitat community studies

Abstract: Wetlands are being restored throughout the United States in an effort to replace habitat functions lost following drainage. We studied the macroinvertebrate communities that developed in wetlands restored by the U.S. Fish and Wildlife Service and compared them to those occurring at natural wetlands in the same area. During the 3 yr of the study, most taxa found at the natural sites could also be found in similar numbers at the restored sites. Insects with aerial dispersal capability rapidly colonized the restored habitats, but some less mobile forms (noninsects and some hemipterans) either colonized more slowly or not at all. We analyzed the effects of experimental techniques for site preparation that were applied before restoration of hydrology to determine if they influenced macroinvertebrate recolonization. Transplantation of remnant wetland soil, which resulted in faster and more prolific plant growth, significantly increased overall macroinvertebrate numbers, and significantly increased the abundance of 10 specific taxonomic groups. The use of this technique, along with possible inoculation of some less mobile taxa, could improve efforts to reestablish natural macroinvertebrate communities to newly restored wetland habitats.

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1134. Marsh impoundments for the management of wildlife and plants in Louisiana.

Chabreck, R. H. and Junkin, G. M.

In: Marsh Management in Coastal Louisiana: Effects and Issues. (Held 7 Jun 1988-10 Jun 1988 at Baton Rouge, LA.) Duffy, W. G. and Clark, D. (eds.): Fish and Wildlife Service, U.S. Department of the Interior; pp. 112-119; 1989. NAL Call #: QH540.U562 no.89(22)

Abstract: Marsh impoundments are widely used in coastal regions for improving wildlife habitats, aquaculture, water storage for agricultural irrigation and industrial uses, flooding of marshes for mosquito control, and maintenance of favorable water depths for navigation. Impoundments used to improve wildlife habitat can be categorized into 4 types by water depth and salinity regimes: permanently flooded with freshwater, manipulated freshwater, permanently flooded with brackish water, and manipulated brackish water. In certain areas, eg SE Louisiana, impoundment use is limited because of the fluid nature of the subsoil. -from Authors

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1135. Nekton use of salt marshes of the Southeast region of the United States.

Rozas, Lawrence P.

In: Coastal Zone: Proceedings of the Symposium on Coastal and Ocean Management. (Held 19 Jul 1993-23 Jul 1993 at New Orleans, La.); Vol. 1.

New York: American Society of Civil Engineers; pp. 528-537; 1993.

NAL Call #: HT391.S935 1993; ISBN: 087262918X

Abstract: Published studies of nekton in salt marshes of the Southeast Region of the U.S. were reviewed to identify fish and decapod crustaceans associated with marsh-surface habitats, to describe preferred microhabitats, and to compare habitat use between the Gulf of Mexico and Atlantic coasts. Nekton assemblages are dominated by estuarine resident species such as daggerblade grass shrimp *Palaemonetes pugio*, sheepshead minnow *Cyprinodon variegatus*, and several other cyprinodonts. Other numerically dominant cyprinodont *variegatus*, and several other cyprinodonts. Other numerically dominant cyprinodonts are: gulf killifish *Fundulus grandis* and diamond killifish *Adinia xenica* on the Gulf coast and mummichog *F. heteroclitus*, spotfin killifish *F. luciae*, and striped killifish *F. majalis* on the Atlantic coast. Most resident species can use interior marshes that are remote from subtidal habitats. The majority of estuarine transients, including many fishery species (e.g., spotted seatrout *Cynoscion nebulosus* and brown shrimp *Penaeus aztecus*), select marsh edge, that part of the marsh surface immediately adjacent to subtidal habitats. Marsh submergence time also influences habitat selection. Nekton assemblages using the marsh surface along the Atlantic and Gulf coasts differ not only in terms of species composition, but also by nekton densities. Densities on Gulf coast marshes are at least an order of magnitude greater than those reported from Atlantic coast marshes. Differences in habitat utilization may be due to dissimilarities in marsh geomorphology, tidal regimes, or rates of relative sea level rise along the two coasts.

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1136. Nitrate removal for Platte Valley, Nebraska synthetic groundwater using a constructed wetland model.

Robins, J. P.; Rock, J.; Hayes, D. F.; and Laquer, F. C.

Environmental Technology 21(6): 653-659. (2000)

NAL Call #: TD1.E59; ISSN: 0959-3330

Descriptors: groundwater/ carbon/ cellulose/ denitrification/ nitrate/ organic matter/ oxygen/ retention/ starch/ water quality/ removal/ nitrogen/ models/ artificial wetlands

Abstract: The purposes of this study were (i) to show that nitrate removal by denitrification from Platte Valley, Nebraska, USA, synthetic groundwater was possible utilizing a model, laboratory-scale, constructed wetland (MW) and (ii) to evaluate the influence of MW on water quality when the hydraulic retention time (HRT) was varied. Denitrification was successfully achieved using a starch and cellulose mixture as the carbon source, instead of carbon from plant growth, and a 30 mg nitrate-N litre⁻¹ synthetic feed concentration. For 1, 3, and 7 day HRTs, the MW achieved nitrate-N plus nitrite-N (nitrate/nitrite-N) removals of 82%, 98%, and 88%, respectively. The effluent nitrate/nitrite-N levels were not significantly different, based on their 95% confidence intervals. For all HRTs, average effluent organic-N concentrations were less than 2.0 mg litre⁻¹ and average effluent ammonia-N values were less than 0.5 mg litre⁻¹. For 356 mg litre⁻¹ chemical oxygen demand (COD) addition to the MW, the MW achieved COD removals of 84%, 89%, and 98% for the 1, 3, and 7 day HRTs, respectively. Volatile fatty acid effluent levels were below the detection limit. Residual organic matter in the treated water may make further treatment necessary.

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1137. Nitrogen retention and release in Atlantic white cedar wetlands.

Zhu, Wei Xing and Ehrenfeld, Joan G

Journal of Environmental Quality 29(2): 612-620. (2000)

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

Descriptors: freshwater ecology/ ecology, environmental sciences/ pollution assessment control and management/ soil science/ laboratory incubations/ laboratory techniques/ Atlantic white cedar wetlands/ groundwater: nitrogen enriched/ hollows/ hummocks/ nitrification rates/ nitrogen saturated sediments/ pulsed stormwater inputs/ runoff: nitrogen enriched/ soil total Kjeldahl nitrogen [soil TKN]/ suburban watersheds/ undisturbed watersheds/ water quality degradation/ wetland peats

Abstract: The fate of N inputs to freshwater wetlands from enriched runoff, ground water, or atmospheric deposition reflects a variety of processes that determine the net retention of N or its release to downstream ecosystems. The history of N enrichment may affect the relative importance of different pathways. We compared the ability of sediments from Atlantic cedar wetlands in suburban and undisturbed watersheds to remove added inorganic N in laboratory incubations. Three pulses of NH₄NO₃, at 50 mg N L⁻¹ concentration, were added at consecutive 2-wk intervals as an analog of pulsed stormwater inputs. After each incubation, soils were leached with CaCl₂ and inorganic N concentrations in the leachate were analyzed. The peats retained added N during the first incubation, but after the second and third, all soils released more N than had been added. Nitrate concentrations were always lower than ammonium concentrations. Soils from hollows and most hummocks retained added nitrate throughout the

study, but all soils released ammonium. Soil extractable ammonium increased four to 10 times after the 6-wk incubation, while extractable dissolved organic N (DON) decreased. There also was a net decrease of soil total Kjeldahl N (TKN). The patterns of retention and release of nitrate and ammonium were correlated positively with the N mineralization and nitrification rates of the soils. Our results suggest that wetland peats in suburban drainages may have limited ability to retain frequent, pulsed N inputs from runoff and high intrinsic N mineralization in N-saturated sediments can become a cause of water quality degradation.

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1138. Nutrient interactions, plant productivity, soil accretion, and policy implications of wetland enhancements in coastal Louisiana.

Brantley, Christopher G. / Louisiana State University, 2005.
[http://etd.lsu.edu/docs/available/etd-10242005-143348/unrestricted/\(Brantley\)dissert.pdf](http://etd.lsu.edu/docs/available/etd-10242005-143348/unrestricted/(Brantley)dissert.pdf)

1139. Population biology and management of rare plants in depression wetlands of the southeastern coastal plain, USA.

Edwards, A. L. and Weakley, A. S.
Natural Areas Journal 21(1): 12-35. (Jan. 2001)
Descriptors: wetlands/ rare species/ plants/ population studies/ management/ conservation/ environmental degradation/ USA/ aquatic plants/ check lists/ distribution records/ population structure/ species diversity/ dominant species/ population genetics/ degradation/ marshes/ salt marshes/ nature conservation/ ecosystem management/ coastal zone/ bays/ coastal plains/ USA, Southeast/ USA, South Carolina, Carolina Bay/ coastal plains/ conservation/ water and plants/ conservation, wildlife management and recreation

Abstract: One of the greatest challenges for conservation biologists is how to minimize biodiversity losses in the face of staggering habitat destruction. In the southeastern United States, a majority of the depression wetlands (Carolina bays, limesinks, and other landscape depressions) have been altered or destroyed. These wetlands harbor a large proportion of the region's rare species. Surprisingly, there is no single resource from which the patterns of rarity, life history characteristics, and vegetation alliances for species can be obtained. We extracted information from natural heritage program lists, floristic manuals, and primary literature to synthesize information on rare plants in isolated, seasonally ponded depression wetlands in the southeastern coastal plain. Out of 197 species of concern listed in six states, 69 were threatened to varying degrees, occurring in a few to approximately 100 populations (G1-G3G4 species), and 128 were relatively secure with 100 or more populations but were rare in a portion of their geographical ranges. Rare species in depression wetlands were predominately perennial and clonal (120 species), which reflects the prevalence of that life form throughout southeastern wetlands. The perennial and clonal growth form can influence population demographic and genetic structure, and should influence the management of rare plants in depression wetlands. To preserve rare species, it is important to know where they occur and what aspects of their habitats and biology most limit their persistence.

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1140. Quantification of the water budget and nutrient loading in a small peatland.

Drexler, J. Z.; Bedford, B. L.; DeGaetano, A. T.; and Siegel, D. I.

Journal of the American Water Resources Association 35(4): 753-769. (Aug. 1999)

NAL Call #: GB651.W315; *ISSN:* 1093-474X

Descriptors: wetlands/ peat bogs/ nutrients/ evapotranspiration/ groundwater/ hydrology/ hydrologic budget/ agriculture/ peat/ water budget/ eutrophication/ nutrients (mineral)/ chemical processes/ habitat community studies/ physics and chemistry

Abstract: Few water budgets exist for specific types of wetlands such as peatlands, even though such information provides the basis from which to investigate linkages between wetlands and upland ecosystems. In this study, we first determined the water budget and then estimated nutrient loading from an upland farm field into a 1.5 ha, kettle-block peatland. The wetland contains highly anisotropic peat and has no distinct, active layer of groundwater flow. We estimated the depth of the active layer using Fick's law of diffusion and quantified groundwater flow using a chemical mass balance model. Evapotranspiration was determined using MORECS, a semi-physical model based on the Penman-Monteith approach. Precipitation and surface outflow were measured using physical means. Groundwater provided the major inflow, 84 percent (44,418 m super(3)) in 1993 and 88 percent (68,311 m super(3)) in 1994. Surface outflow represented 54 percent (28,763 m super(3)) of total outflows in 1993 and 48 percent (37,078 m super(3)) in 1994. A comparison of several published water budgets for wetlands and lakes showed that error estimates for hydrologic components in this study are well within the range of error estimates calculated in other studies. Groundwater inflow estimates and nutrient concentrations of three springs were used to estimate agricultural nutrient loading to the site. During the study period, nutrient loading into the peatland via groundwater discharge averaged 24.74 kg K ha super(-1), 1.83 kg total inorganic P ha super(-1), and 21.81 kg NO sub(3)-N ha super(-1).

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1141. Restoration and creation of palustrine wetlands associated with riverine systems of the glaciated northeast.

Lowry, D. J.
 In: *Wetland Creation and Restoration: The Status of the Science.*

Covelo, Calif.: Island Press, 1990; pp. 267-280.

Notes: ISBN: 1559630450

NAL Call #: QH541.5.M3W462

Descriptors: artificial wetlands/ glaciation/ habitat restoration/ water resources management/ wetland restoration/ environmental policy/ environmental quality/ monitoring/ research priorities/ water resources development

Abstract: Published information on freshwater wetland creation in the glaciated northeastern United States is largely limited. Though there is more experience in constructing wetlands than the literature base would indicate, there has been no compilation of the experience obtained from most of the wetland creation projects in the region and there appears to be a general lack of detailed monitoring which would provide data necessary for

assessment of results. Long-term, comprehensive studies evaluating the functions of created freshwater wetlands in the region are not presently being conducted. There is, therefore, a need to document the ability of such areas to provide a range of ecological and hydrological functions, rather than just serving as sites where wetland plants grow and that waterfowl visit. In evaluating future projects involving wetland creation as mitigation for wetland loss in the region, the following critical points should be emphasized: (1) the project proposal should provide an assessment of the wetland functions; (2) goals should be developed based on the most significant functions; (3) the hydrologic setting and water budget of the created area must be understood; (4) present capabilities to create other wetland types (swamps, fens, bogs) is in question; (5) every attempt should be made to replace lost wetland in the same hydrogeologic unit and reach of the riverine system associated with the original wetland; (6) an understanding of the area where the wetland is proposed to be created is needed; (7) detailed consideration of a number of logistical constraints (hydrologic controls, machinery needs, availability of plant stock and soils, sediment and erosion control, wildlife predation, and barriers to human intrusion) is always necessary; and (8) monitoring requirements should depend on the functions determined to be of most significance at the assessment stage.

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1142. A review of basin morphology and pool hydrology of isolated ponded wetlands: Implications for seasonal forest pools of the northeastern United States.

Brooks, Robert T.

Wetlands Ecology and Management 13: 335-348.

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

<http://www.treeseearch.fs.fed.us/pubs/21526>

Descriptors: amphibians/ aquatic invertebrates/ hydrology/ hydroperiod/ seasonal forest pools/ woodland vernal pools
Abstract: Seasonal forest pools (SFPs) are geographically- and hydrologically- isolated ponded wetlands, in that they are topographically isolated from other surface waters. SFPs occur commonly throughout the temperate forests of the eastern United States and adjacent Canada. SFPs are ephemeral in occurrence, typically drying annually. The regular drying of SFPs excludes fish from these habitats, and as a result, they are the preferred breeding habitat of some amphibians, notably ambystomid ('mole') salamanders and wood frogs (*Rana sylvatica* Le Conte). The pools also support a rich and diverse invertebrate fauna. The duration of the wet phase, or hydroperiod of SFPs, has been repeatedly shown to be the dominant influence on the composition and fitness of the faunal community of the pools. Despite the importance of SFP hydrology, it is a poorly studied subject. This paper reviews the limited state-of-knowledge of seasonal forest pool hydrology and associated basin morphology. The review discusses findings from studies of other isolated ponded wetlands that could be applicable to our understanding of the hydrology of SFPs.

This citation is from Treeseearch.

1143. A review of early literature on forested wetlands in the United States.

Lugo, A. E. (1984)

Descriptors: wetlands/ reviews/ forests/ ecology/ literature reviews/ USA/ literature/ forested/ literature reviews/ reviews/ habitat community studies

Abstract: A review of the literature dealing with freshwater-forested wetlands reveals three phases prior to 1970: early descriptions, formal descriptive accounts, and ecological descriptions. Each of these phases is reviewed with the objective of presenting the points of view of early students of forested wetlands and focusing on the generalizations that emerged from those studies. Specific topics of discussion are species composition and diversity, vegetation structure and physiognomy, response to flooding, succession, site factors and wetland classification, wildlife, and uses and values.

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1144. Riverine floodplain forests of the southeastern United States: Invertebrates in an aquatic-terrestrial ecotone.

Smock, Leonard A.

In: *Invertebrates in freshwater wetlands of North America: Ecology and management/* Batzer, Darold P.; Rader,

Russell B.; and Wissinger, Scott A.

New York: John Wiley & Sons, 1999; pp. 137-165.

Notes: ISBN: 0471292583

NAL Call #: QL365.4.A1158

Descriptors: Macroinvertebrata/ life cycle/ riverine flood plain forest fauna life history adaptations/ biomass/ productivity/ community structure/ population density/ riverine flood plain forest community characteristics review/ distribution within habitat/ semiaquatic habitat/ flood plain forests community characteristics review/ flood plain habitat/ forest and woodland/ forested freshwater wetland community characteristics review/ flooding/ hydrologic cycle effect on riverine flood plain forest community/ USA, Southeast

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1145. The role of canopy gaps in maintaining vascular plant diversity at a forested wetland in New York State.

Anderson, Kimberly L. and Leopold, Donald J.

Journal of the Torrey Botanical Society 129(3): 238-250. (2002)

NAL Call #: QK1.J687; ISSN: 1095-5674

Descriptors: biodiversity/ ecology: environmental sciences/ groundwater ecology: ecology, environmental sciences/ canopy gaps/ forested wetland: habitat/ microsite heterogeneity

Abstract: We studied species diversity and composition of herbaceous layer vascular plant communities under closed canopies and within gaps in a central New York conifer swamp. Our study site, Nelson Swamp, has high documented species richness and supports a large number of state-protected species. Understory cover and species richness at both the quadrat and gap scale were compared among closed canopy areas and gaps in three size classes. To assess differences in the understory environment among the three size classes, we compared light, hydrology, and microtopography. We also tested for correlations between gap species richness and light, wetness, and microsite heterogeneity to determine which aspects of the gap environment might influence vascular

plant diversity therein. There was higher quadrat- and gap-level species richness in gaps than in closed canopy areas. Small gaps did not appear to offer a physical environment substantially different from non-gaps, as no differences in their understory communities were apparent. Mid-sized and large gaps had higher species richness, substrate heterogeneity, and water table fluctuation than small gaps. Based on the correlations, the individual factors influencing species richness at the gap scale were depth to water, water level fluctuation, and microtopographic variability, indicating the importance of hydrology over light as a species control. Although gaps and non-gaps shared many of the same species, there were distinct subsets of species that were more important in either type of community. Based on these subsets, closed canopy areas and large gaps can be viewed as two ends of a continuum corresponding to light and hydrology gradients. Out of all the species encountered, 10 percent were found exclusively in gaps, and none were found only under closed canopy. Thus, these gaps are not only sites of higher overall plant growth, but also areas that allow rare species to persist.

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1146. Shorebird use of coastal wetland and barrier island habitat in the Gulf of Mexico.

Withers, Kim

Scientific World Journal 2: 514-536. (2002);

ISSN: 1532-2246

Descriptors: Aves/ habitat management/ implications of coastal wetland and barrier island use by shorebirds/ overview/ migration/ coastal habitat use/ population dynamics/ abundance patterns/ coastal wetland and barrier island habitats/ distribution within habitat/ habitat utilization/ semiaquatic habitat/ coastal wetlands/ habitat use/ overview and conservation implications/ shorebirds/ Mexico and USA/ Mexico/ USA/ Gulf of Mexico/ shorebird abundance and habitat use/ coastal wetlands and barrier islands/ conservation implications

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1147. Soils of Louisiana's coastal marsh.

Murphy, K.

In: *Marsh Management in Coastal Louisiana: Effects and Issues.* (Held 7 Jun 1988-10 Jun 1988 at Baton Rouge, LA.) Duffy, W. G. and Clark, D. (eds.): Fish and Wildlife Service, U.S. Department of the Interior; pp. 58-66; 1989.

NAL Call #: QH540.U562 no.89(22)

Abstract: The vast and unique coastal area of Louisiana was formed through thousands of years of geological change which included sea-level changes, subsidence, and sediment deposition. The 1.3 million ha area of coastal marsh is a very delicate ecosystem composed of two slightly different areas: the Deltaic marsh of southeast Louisiana and the Chenier marsh located along the southwest coastline of the State. All of Louisiana's coastal marsh soils have the common characteristics of wetness, flooding, low elevation, and low relief. -from Author

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1148. Southern forested wetlands: Ecology and management.

Messina, M. G. and Conner, William H.

Boca Raton, Fla.: Lewis Publishers; 616 p. (1998)

Notes: Includes bibliographical references (p. 493-582) and index.

NAL Call #: SD410.9.S68 1998; ISBN: 1566702283

Descriptors: wetland forestry/ forested wetlands---management/ wetlands---management/ wetland ecology/ forest ecology

This citation is from AGRICOLA.

1149. Submerge, salt-water intrusion, and managed Gulf Coast marshes.

Nyman, J. A.; Chabreck, R. H.; DeLaune, R. D.; and Patrick, W. H.

In: *Coastal Zone: Proceedings of the Symposium on Coastal and Ocean Management.* (Held 19 Jul 1993-23 Jul 1993 at New Orleans, La.); Vol. 2.

New York: American Society of Civil Engineers; pp. 1690-1704; 1993.

NAL Call #: HT391.S935 1993; ISBN: 087262918X

Abstract: Many coastal marshes are managed to improve wildlife habitat. Simultaneous salt-water intrusion and rapid submergence in Louisiana place additional demands on marsh managers and may become common worldwide because of the greenhouse effect. Current management practices often counter salt-water intrusion but not submergence, which is offset by soil formation. The purpose of this paper is to help Gulf Coast marsh managers understand how marsh management may influence soil formation by providing an overview of the relevant physical, chemical, and biological processes. Organic matter accumulation controls soil formation in Louisiana marshes, thus vigorous plant growth should promote soil formation. Soil aeration controls many factors that limit plant growth. An indication of soil aeration is Eh, which is greater in drained soils than in waterlogged soils. Eh also depends partly on soil organic matter qualities. Eh is greater in *Spartina Patens* soil than in *Panicum hemitomon* or *Spartina alterniflora* soil even when hydrological conditions are the same.

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1150. Subsidence in coastal Louisiana: Causes, rates, and effects on wetlands.

Boesch, D. F.; Levin, D.; Nummedal, D.; and Bowles, K.

U.S. Fish and Wildlife Service; FWS/OBS-83/26, 1983. 42 p.

Descriptors: wetlands/ geomorphology/ habitat changes/ land/ water level/ sedimentation/ mapping/ man/ marshes/ North America/ United States/ Louisiana/ coastal region

Abstract: Purpose of this review is to summarize the known causes of subsidence or land loss in coastal Louisiana, to examine the available data on subsidence rates, and to review the effects of subsidence on wetlands.

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1151. Temporarily flooded wetlands of Missouri: Invertebrate ecology and management.

Magee, Patrick A.; Reid, Frederic A.; and Fredrickson, Leigh H.

In: *Invertebrates in freshwater wetlands of North America: Ecology and management/* Batzer, Darold P.; Rader, Russell B.; and Wissinger, Scott A.

New York: John Wiley & Sons, 1999; pp. 691-710.

Notes: ISBN: 0471292583

NAL Call #: QL365.4.A1158

Descriptors: Invertebrata/ habitat management/ ecology/ temporarily flooded wetlands/ semiaquatic habitat/ flooding/ Missouri/ temporarily flooded wetlands ecology and management

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1152. Vegetative marsh management in Louisiana: Long-range recommendations.

Good, B.

In: Marsh Management in Coastal Louisiana: Effects and Issues. (Held 7 Jun 1988-10 Jun 1988 at Baton Rouge, LA.) Duffy, W. G. and Clark, D. (eds.): Fish and Wildlife Service, U.S. Department of the Interior; pp. 222-234; 1989. *NAL Call #:* QH540.U562 no.89(22)

Abstract: The major objectives of vegetative marsh management are to prevent the conversion of marsh to open water and to control the erosion at marsh-water interfaces. In many cases soil stabilization can be accomplished most cost-effectively with vegetative marsh management. Succession acceleration can reduce erosion if an environment changes faster than natural plant succession can recolonize the area. A proposed procedure for selecting an optimal project design incorporates site evaluation data, the likelihood of project success, potential benefits, and project costs. A state-wide prioritization scheme is suggested that would locate vegetation projects in those areas with the highest rates of wetland loss. -from Author

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1153. Wetland mitigation along the Pacific coast of the United States.

Griswold, T.; Zedler, J.; and Josselyn, M.

In: Wetland Creation and Restoration: The Status of the Science.

Covelo, Calif.: Island Press, 1990; pp. 3-36.

Notes: ISBN: 1559630450

NAL Call #: QH541.5.M3W462

Descriptors: artificial wetlands/ coastal zone management/ habitat restoration/ water resources management/ wetland restoration/ coastal lagoons/ coastal marshes/ databases/ estuarine environment/ hydrologic properties/ monitoring/ vegetation establishment/ water resources development/ watershed management/ wildlife habitats

Abstract: Mitigation to compensate for coastal wetland losses has taken place under federal and state permit policies for over 15 years. As a result, a substantial

database has developed in the scientific and governmental literature on which to base recommendations for improvement in mitigation practice. Hydrologic characteristics of a mitigation site are especially important as they structure the possible wetland habitats that can be created. Within the Pacific coastal zone, four general hydrological types occur: wetlands associated with small rivers or lagoons, wetlands associated with major estuaries and coastal embayments, wetlands associated with rivers, and non-tidal wetlands. Within each of these broad categories, watershed management and specific opportunities and constraints must be considered prior to approving mitigation proposals. Elements that need to be included within mitigation proposals are a description of existing conditions, a description of proposed hydrological conditions, means by which mitigation site constraints are to be ameliorated, planting procedures, determination of appropriate buffers, enforceable construction procedures, and monitoring programs. Outside of site-specific review, resource agencies must assess the long-term implications of individual permit approvals. Reappraisal should be based on detailed analysis contained within accessible database files. Such appraisal can provide important information on regional trends and means by which mitigation can be redirected to better serve fish and wildlife needs. (Author 's abstract)

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1154. Wetlands in the northern Great Plains: A guide to values and management.

Berry, Charles R.; Buechler, Dennis G.; Wentz, W. Alan; South Dakota State University. Cooperative Extension Service; and U.S. Prairie Pothole Joint Venture Washington, D.C.?: U.S. Fish and Wildlife Service; 13 p. (1993)

Notes: Caption title. "Published by a cooperative agreement between the U.S. Fish and Wildlife Service (U.S. Prairie Pothole Joint Venture) and the Agricultural Extension Service, South Dakota State University, Brookings, S.D. Funding was provided by the U.S. Fish and Wildlife Service, the Federal Highway Administration, and the U.S. Army Corps of Engineers"--P. 13. "Update of Wetland values and management ... 1981"--P. 13.

NAL Call #: QH541.5.M3B47 1993

Descriptors: wetland ecology---Great Plains/ wetlands---Great Plains

This citation is from AGRICOLA.

Effects of Agricultural Conservation Practices on Wetlands

1155. Bioassessment of silvicultural impacts in streams and wetlands of the Eastern United States.

Hutchens, J. J.; Batzer, D. P.; and Reese, E.
Water, Air, and Soil Pollution 4(1): 37-53. (2004)
NAL Call #: TD172 .W36; ISSN: 1567-7230.
Notes: Water, Air, and Soil Pollution: Focus
Descriptors: wetlands/ streams/ bioindicators/ environment management/ forestry/ nature conservation/ environmental policy/ logging/ conservation/ USA, East/ environmental action/ water resources and supplies/ water quality control/ general environmental engineering
Abstract: Bioassessment is a useful tool to determine the impact of logging practices on the biological integrity of streams and wetlands. Measuring biota directly has an intuitive appeal for impact assessment, and biota can be superior indicators to physical or chemical characteristics because they can reflect cumulative impacts over time. Logging can affect stream and wetland biota by increasing sedimentation rates, altering hydrologic, thermal, and chemical regimes, and changing the base of food webs. Biotic impacts of logging on streams compared to wetlands probably differ, and in this paper we review some of those differences. In streams, invertebrates, fishes, amphibians, algae, and macrophytes have been used as indicators of logging impacts. In wetlands, bioassessment is just beginning to be used, and plants and birds are the most promising indicator taxa. Various best management practices (BMPs) have been developed to reduce the impacts of logging on stream and wetland biota, and we review quantitative studies that have evaluated the efficacy of some of these techniques in streams and wetlands in the eastern United States. Remarkably few studies that address the overall efficacy of BMPs in limiting biotic changes in streams and wetlands after BMP implementation have been published in scientific journals, although some work exists in reports or is unpublished. We review these works, and compile conclusions about BMP efficacy for biota from this body of research.
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1156. A case study of changing land use practices in the Northern Great Plains, USA: An uncertain future for waterbird conservation.

Higgins, K. F.; Naugle, D. E.; and Forman, K. J.
Waterbirds 25(2 [supplement]): 42-50. (2002)
NAL Call #: QL671; ISSN: 1524-4695.
Notes: Managing Wetlands for Waterbirds: Integrated Approaches
Descriptors: wetlands/ land use/ habitat changes/ agricultural practices/ conservation/ wildlife management/ aquatic birds/ habitat/ breeding sites/ agriculture/ nature conservation/ ecosystem management/ environmental protection/ Aves/ United States, Great Plains/ birds/ mixed grass prairies/ conservation, wildlife management and recreation/ reproduction and development
Abstract: Wetland and grassland habitats of the northern Great Plains are a primary breeding ground for waterbirds in North America. Native mixed grass prairies that were historically used for cattle grazing have met with changing social and economic pressures that put the remaining 40% of this resource at high risk of tillage. In this paper, we describe the current state of our waning rural societies, characterize impacts of land use change on waterbird

habitats, and discuss conservation actions to benefit waterbirds. Recent population statistics indicate that a record number of farmers facing low commodity prices are selling their farms and moving to urban centers for employment. Other farmers are shifting from diversified agriculture to monoculture grain farming to take advantage of farm programs that provide incentives to bring marginal land into production. Additional data indicate that concurrent changes in crop types have decreased quality of farmland wildlife habitat while bigger and faster farm equipment and genetically modified crops continue to make farming marginal land less risky. Legislators and administrators should be advised that waterbird habitat loss continues to expand westward. The last chance to sustain the unique grassland-wetland character of the northern Great Plains is to accelerate grassland conservation with short- and long-term stewardship programs and incentives to family ranchers. This philosophy is of vital importance because it also protects wetland habitats that otherwise are vulnerable to drainage when native prairie is converted to cropland. Lastly, and perhaps most importantly, this would conserve our prairie heritage for future generations while preserving the private property rights of landowners.
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1157. Changes in species diversity in peatlands drained for forestry.

Vasander, Harri; Laiho, Rajja; and Laine, Jukka
In: Northern forested wetlands: Ecology and management/ Trettin, Carl C.; Jurgensen, Martin F.; Grigal, David F.; and Gale, Margaret R.
Boca Raton, Fla.: CRC Press, Inc., 1997; pp. 109-119.
Notes: ISBN: 1566701775. Meeting Information: Papers presented at the International Symposium on the Ecology and Management of Northern Forested Wetland, Traverse City, Michigan, USA; Cochrane, Ontario, Canada; August 24-31, 1994
Descriptors: biodiversity/ forestry/ freshwater ecology: ecology, environmental sciences/ northern forested wetland/ peatland drainage/ species diversity/ book chapter/ meeting paper
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1158. Cumulative impact assessment in bottomland hardwood forests.

Gosselink J. G. and Lee L. C.
Wetlands 9(Special Issue): 83-174. (1989)
NAL Call #: QH75.A1W47; ISSN: 0277-5212
Descriptors: conservation/ ecology: environmental sciences/ forestry/ freshwater ecology: ecology, environmental sciences/ soil science/ wetland forest function/ conservation/ biogeography/ streams/ lakes/ nutrient loading rates/ south central, southeastern USA
Abstract: Bottomland hardwood forest ecosystems of the south central and southeastern United States include extensive areas of palustrine forested wetlands. They are valuable to humans because they support a high density and diversity of flora and fauna, help protect the quality of water and habitat in adjacent streams, and serve as flood water storage areas. These ecosystems, however, have been rapidly transformed or modified over the past 40 years. About 20 million ha remain out of an historical area of over 100 million ha. Most of this area is now in row crop

production, although hydrologic modification by flood control projects is also an important impact. The cumulative impact of incremental forest loss has been deleterious to ecosystem processes upon which society depends. It has caused increased flooding, turbid and eutrophic streams and lakes, and loss of plant and animal species including top carnivores, such as large mammals and raptors, and birds adopted to forest interiors. Regulation of cumulative impacts raises issues that are not addressed by traditional site-specific permit evaluation. For example, because the spatial scale of cumulative impacts is large relative to most individual permit request sites, ecological complexity is dramatically increased, spatial and conceptual boundaries are unclear, and ecological processes that depend on large landscape patterns are difficult to conserve. From a policy standpoint, the issue is plagued by a lack of objective, scientific data; fragmented jurisdiction; a need to set goals within which individual permits can be evaluated; the need to maintain regional flexibility; and the imperative to develop a way of maintaining and updating records. Many of the scientific and technical questions of resource conservation, appropriate to cumulative impact management, have been addressed previously in the context of island biogeography as applied to nature reserves. The extensive literature on this subject is summarized in this report. In this report we describe a method for cumulative impact assessment and management in bottomland and hardwood wetlands that uses the landscape approach of island biogeography. Goals for this approach are two-fold. The first is to conserve bottomland forest functions, such as water-dependent terrestrial and wetland-dependent aquatic organisms, subsidized production, water quality, and flood water desynchronization. The second is to conserve landscape pattern-i.e., large blocks of bottomland/upland forest, appropriately interspersed with smaller tracts, continuity among forest patches, contiguity between bottomland forest and stream, and between bottomland and upland forest. Generally, the bottomland hardwood functions are preserved by conserving landscape integrity. In order to assess the cumulative impact status of an area it is necessary to select an appropriate scale of analysis, characterize the "health" of the landscape unit, and consider the assessment unit in the context of the whole region. From a consideration of ecological, socio-political, and mapping scales, we recommend an assessment unit of about 1 million ha. We also describe eight fairly simple indices of forest system integrity that, when taken together, characterize the assessment unit. Three of these involve structural features of the landscape: forest loss, forest contiguity, and forest pattern. The other five indices are functional indices that integrate over the entire landscape: change in discharge rating curves, change in water residence time, stream nutrient concentration trends, nutrient loading rates, and native biotic diversity. Finally we summarize briefly a suggested procedure for cumulative impact management that involves boundary determination, cumulative impact assessment, goal-setting and planning, and permit evaluation in the context of the cumulative impact management plan.

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1159. Determination of the environmental impact of several substitute chemicals in agriculturally affected wetlands.

Meyers, S. P.; Gambrell, R. P.; Day, J. W.; and Environmental Research Laboratory (Gulf Breeze, Fla., EPA-600/4-82-052; Washington, D.C.: U.S. Environmental Protection Agency, 1982. xiii, 136 p.

Notes: NTIS Order No.: PB82-242017;

Grant EPA-R-804976

Descriptors: wetlands/ sediments/ simulation/ environmental impact/ parathion/ pesticides/ pollution detection/ agricultural runoff/ chemical pollutants/ agriculture/ chemical pollutants/ Kepone/ Guthion/ parathion/ land pollution/ insecticides/ methods and instruments

Abstract: Procedures have been developed for processing of anaerobic wetland sediments for pesticide recovery along with formulation of simulation models of anaerobic/aerobic soil and sediment environments to study pesticide degradation. Redox conditions of soils and sediment-water systems have a significant effect on in situ persistence of synthetic organic pesticides. Chemical and microbiological characteristics of wetland sediments have equally important consequences on mobility and degradation of toxic compounds. The total invertebrate community of selected backswamp regions has been examined as affected by Guthion and other pesticides. A system of continuous-flow and static microcosm systems have been developed for quantitative analyses of the effect of selected toxic substances, including Guthion, methyl parathion, and Kepone. Decomposition of ecologically-significant substrates such as chitin is variously affected by different toxic substances as shown in microcosm investigations.

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1160. Effects of forest management on surface water quality in wetland forests.

Shepard, J. P.

Wetlands 14(1): 18-26. (1994)

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

Descriptors: wetlands/ water quality/ forest industry/ fertilizers/ harvesting/ literature reviews/ environmental impact/ nutrients (mineral)/ sediments/ resource management/ logging/ environmental effects/ forest management/ literature review/ USA/ forest management/ literature review/ forest industry/ harvesting/ nutrients (mineral)/ logging/ environmental effects/ literature reviews/ environmental impact/ resource management

Abstract: A literature review on the effects of silvicultural practices on water quality in wetland forests was conducted. The review summarized results from nine wetland forests in five states (AL, FL, MI, NC, and SC). Silvicultural practices assessed were timber harvesting (including thinning and clearcutting), site preparation, bedding, planting, drainage, and fertilization. Many of the studies reviewed observed increased concentrations of suspended sediment and nutrients following silvicultural operations when compared with undisturbed controls. Water quality criteria were rarely exceeded by silvicultural operations, however, and effects on water quality were transient. Water quality parameters returned to undisturbed levels within a period ranging from months to several years.

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1161. Effects of silvicultural activity on ecological processes in floodplain forests of the southern United States: A review of existing reports.

Lockaby, B. G.; Stanturf, J. A.; and Messina, M. G. *Forest Ecology and Management* 90(2-3): 93-100. (1997)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: functions/ harvests/ wetland forests
Abstract: Activities associated with timber harvesting have occurred within floodplain forests in the southern United States for nearly two hundred years. However, it is only in the last ten years that any information has become available about the effects of harvesting on the ecological functions of this valuable resource. Hydrology is the driving influence behind all ecological processes in floodplains, and timber harvesting alone usually has little long-term effect on hydroperiod. However, logging roads, built in association with harvest sites, can sometimes alter hydroperiod to the extent that vegetation productivity is raised or lowered. There is no evidence that harvesting followed by natural regeneration represents a threat to ground or surface water quality on flood plain sites, as long as 'best management practices' are followed. Harvested floodplains may increase or have little effect on decomposition rates of surface organic matter. The nature of the effect seems to be controlled by site wetness. Data from recently harvested sites (i.e. within the last ten years) suggest that vegetation productivity is maintained at levels similar to those observed prior to harvests. During the early stages of stand development, tree species composition is heavily influenced by harvest method. Similarly, amphibian populations (monitored as bioindicators of ecosystem recovery) seem to rebound rapidly following harvests, although species composition may be different from that of unharvested stands.

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1162. Effects of timber management on the hydrology of wetland forests in the southern United States.

Sun, G.; McNulty, S. G.; Shepard, J. P.; Amatya, D. M.; Riekerk, H.; Comerford, N. B.; Skaggs, W.; and Swift, L. *Forest Ecology and Management* 143(1-3): 227-236. (2001)
NAL Call #: SD1.F73; ISSN: 0378-1127

<http://www.srs.fs.usda.gov/pubs/2756>

Descriptors: wetlands/ hydrology/ streams/ forest management/ USA, Southeast/ forest industry/ environmental impact/ rivers/ flood plains/ USA/ forests/ forest hydrology/ runoff/ USA, South
Abstract: The objectives of this paper are to review the hydrologic impacts of various common forest management practices that include harvesting, site preparation, and drainage. Field hydrological data collected during the past 5-10 years from ten forested wetland sites across the southern US are synthesized using various methods including hydrologic simulation models and Geographic Information Systems. Wetland systems evaluated include red river bottoms, black river bottoms, pocosins, wet mineral flats, cypress domes, and pine flatwoods. Hydrologic variables used in this assessment include water table level, drainage, and storm flow on different spatial and temporal scales. Wetland ecosystems have higher water storage capacity and higher evapotranspiration than uplands. Hydrologic impacts of forest management are variable, but generally minor, especially when forest best management practices are adopted. A conceptually generalized model is developed to illustrate the relative

magnitude of hydrologic effects of forest management on different types of wetlands in the southern US. This model suggests that in addition to soils, wetland types, and management practice options, climate is an important factor in controlling wetland hydrology and the magnitude of disturbance impacts. Bottomland wetlands, partial harvesting, and warm climate usually offer conditions that result in low hydrologic impact.

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1163. Evaluation of management practices and farming systems on Missouri wetland wildlife areas: A survey of agricultural cropping systems and wetland management practices on selected Missouri Department of Conservation wildlife areas.

Graber, D. A. Missouri Dept. of Conservation, 1987. 20 p. Annual Report .

Descriptors: wetlands/ evaluation/ surveys/ cultivated farmland/ farms/ food crops/ habitat management/ questionnaire/ fertilization, soil and water/ water resources management/ plant control/ vegetation/ floods
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1164. Evaluation of management practices and farming systems on Missouri wetland wildlife areas: Determining the nutritional value of selected moist soil seeds and wetland agricultural crops.

Graber, D. A. Missouri Dept. of Conservation, 1989. 13 p.

Descriptors: wetlands/ amino acids/ bioenergetics/ cultivated farmland/ evaluation/ farms/ floods/ food crops/ goose, Canada/ metabolism/ nutrients/ nutrition/ overwintering/ proteins/ seeds/ wildlife management areas/ Panicum spp./ Polygonum amphibium/ smartweed/ Sorghum vulgare/ North America/ United States/ Missouri
Abstract: Objectives were to determine: (1) by means of proximate analysis, amino acid assay and gross energy assay, the nutrient content of rowcrops and moist-soil plants (largeseed smartweed, milo, corn, wild millet, nodding smartweed, rice cutgrass, nodding foxtail, beggarticks, and soybean) regularly consumed by wintering Canada Geese in Missouri; (2) the true metabolizable energy of these rowcrops and plants for Canada geese; and (3) to what extent the gross energy of Canada goose foods varies when exposed to non-flooded and flooded conditions for 30, 60, 90 and 15 days between September 1987 and March 1988.

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1165. Forestry best management practices for wetlands in Minnesota.

Phillips, Michael J.
In: Northern Forested Wetlands: Ecology and Management/ Trettin, Carl C.

Boca Raton, Fla.: CRC Lewis, 1997; pp. 403-409
NAL Call #: SD410.9.N67 1997

<http://www.srs.fs.usda.gov/pubs/680>

Abstract: Wetlands are a common landscape feature in Minnesota in spite of significant losses of wetlands to agriculture and development. Prior to European settlement, Minnesota contained 7.5 million ha of wetlands, including both wet, mineral and peat soils. These wetlands covered approximately 35 percent of the state. The current extent of wetlands for Minnesota is approximately 3 million ha, which represents a 60 percent loss of the original wetland acreage (Minnesota Department of Natural Resources,

Protected Water Inventory Data Base, 1984). The majority of the remaining wetlands are found in the forested regions of Minnesota, predominantly located on county, state, and federal lands in northern Minnesota. This citation is from Treeseearch.

1166. Impacts of irrigation drainwater on wetlands.

Deason, J. P.

In: *Wetlands: Concerns and Successes - Proceedings of a Symposium*. (Held 17 Sep 1989-22 Sep 1989 at Tampa, Florida.)

Bethesda, Maryland: American Water Resources Association; pp. 127-138; 1989.

NAL Call #: TC401.A5 no.89-3

Descriptors: wetlands/ agricultural runoff/ drainage water/ environmental effects/ irrigation effects/ selenium/ water pollution effects/ water pollution sources/ Arizona/ California/ geochemistry/ irrigation/ Montana/ Nevada/ Texas/ Utah/ Wyoming

Abstract: Over the past four years, the U.S. Department of the Interior has been engaged in a program to identify, evaluate and respond to irrigation-induced contamination problems in the western states. To date 20 areas in 13 states have been selected for investigation.

Reconnaissance-level studies focusing on identification of irrigation-induced contamination problems have been completed at nine locations in Arizona, California, Montana, Nevada, Texas, Utah, and Wyoming. Results reveal significant adverse impacts on a number of wetland areas receiving irrigation drainage water. Several observations about the nature of irrigation-induced contamination problems can be made: (1) it appears that selenium is the constituent of concern most commonly found at elevated concentrations in wetland ecological systems receiving irrigation drainage water; (2) concentrations of analytes were found to vary widely on a spatial basis in all environmental media sampled; (3) closed watersheds are an important physical characteristic of locations that may tend to exhibit symptoms of irrigation-induced contamination; and (4) other hydrologic and geochemical characteristics can also serve as indicators of potential problems with irrigation drainage.

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1167. Impacts of stressors on the emergence and growth of wetland plant species in Pennsylvania, USA.

Mahaney, W. M.; Wardrop, D. H.; and Brooks, R. P.

Wetlands 24(3): 538-549. (2004)

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

Descriptors: wetlands/ sedimentation/ plant communities/ urbanization/ nitrogen/ greenhouses/ organic matter/ slope/ flood plains/ community composition/ geomorphology/ soils/ environmental impact/ hydrology/ aquatic plants/ prediction/ ecological distribution/ ecosystem disturbance/ growth/ eutrophication/ plant growth/ headwaters/ plant populations/ slopes/ enrichment/ moisture/ agriculture/ species composition/ USA, Pennsylvania

Abstract: Agriculture and urbanization in the upland landscape often generate stressors, such as sedimentation and eutrophication, that may negatively impact wetland plant communities. Individual plant species responses to stressors are also likely influenced by the hydrologic and geomorphologic characteristics of different wetland hydrogeomorphic (HGM) subclasses. The goal of this study was to determine to what extent the two stressors listed

above influence the growth and development of wetland plant species and how these responses vary across HGM subclasses. The impacts of the two stressors on wetland plant species emergence and growth were examined in a 2 x 2 factorial greenhouse experiment, using soil moisture and organic matter content to simulate three HGM subclasses. Both stressors elicited significant responses in species establishment and growth, but overall trends in stressor responses differed by wetland type. For instance, sedimentation reduced the emergence of four species in simulated riparian depressions but only affected one species in simulated slope wetlands and none in simulated headwater floodplains. Sedimentation had little impact on any species establishment or growth in headwater floodplains. Approximately half of the species showed an increase in at least one growth variable in response to nitrogen enrichment. Additionally, the conditions used to simulate HGM subclasses appeared to impact a species performance and sensitivity to stressors. Therefore, further investigation of the impacts of HGM subclass conditions on species performance is needed. We expected differences in species responses to be related to their natural distribution across pristine and impacted wetlands; however, no obvious relationships were found. Our results suggest that it will be difficult to make generalizations about species responses to stressors because responses varied by stressor type, stressor interactions, and HGM subclass. Therefore, perhaps the next step in formulating broad generalizations and predictions about wetland plant community composition will require a shift from species-based approaches to a trait-based approach for examining how species composition may change in response to future disturbances.

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1168. Irrigated agriculture and freshwater wetlands: A struggle for coexistence in the western United States.

Lemly, A. D.

Wetlands Ecology and Management 3(1): 3-15. (1994)

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

<http://www.srs.fs.usda.gov/pubs/1123>

Descriptors: wetlands/ fresh water/ irrigation/ agriculture/ environmental effects/ salinity/ water use/ environmental impact/ drainage/ water demand/ ecological effects/ USA, West/ drainage/ water demand/ ecological effects/ USA, Western/ fresh water/ environmental impact/ environmental effects/ water use

Abstract: This paper is a review of the major environmental problems associated with irrigated agriculture in the western United States. Freshwater wetlands are being contaminated by subsurface agricultural irrigation drainage in many locations. Historic freshwater inflows have been diverted for agricultural use, and remaining freshwater supplies are not sufficient to maintain these important natural areas once they are degraded by irrigation drainage. Migratory birds have been poisoned by drainwater contaminants on at least six national wildlife refuges; waterfowl populations are threatened in the Pacific and Central flyways. Revised water allocation policies and regulatory actions are probably necessary to correct existing damage and prevent future problems. The benefits of maintaining healthy wetlands should be used as a rationale for negotiating increases in freshwater supplies. Cost analyses that show the importance of wetlands in dollar values are critical to the success of these

negotiations. The next few years will provide unique opportunities for wetland managers to use cost analyses to make changes in water allocation policies. Federally subsidized water has supported and expanded agriculture at the expense of native wetlands for over 100 years in the western United States. This trend must be reversed if these wetlands and their fish and wildlife populations are to survive. (DBO)
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1169. Linking surface- and ground-water levels to riparian grassland species along the Platte River in Central Nebraska, USA.

Henzey, R. J.; Pfeiffer, K.; and Keough, J. R.
Wetlands 24(3): 665-687. (2004)

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

Descriptors: wetlands/ rivers/ water levels/ grasslands/ statistical analysis/ meadows/ prairies/ grazing/ aquatic plants/ riparian environments/ riparian vegetation/ river basin management/ community composition/ ground water/ water table/ water management/ environmental impact/ water level/ statistics/ environmental gradient/ model studies/ elevation/ standing waters/ plant populations/ USA, Kansas, Platte R./ USA, Nebraska, Platte R./ temperate grasslands/ environmental effects/ dynamics of lakes and rivers/ streamflow and runoff

Abstract: Nearly all the techniques used to quantify how plants are linked to environmental gradients produce results in general terms, such as low to high elevation, xeric to mesic, and low to high concentration. While ecologists comprehend these imprecise scales, managers responsible for making decisions affecting these gradients need more precise information. For our study, we preserved the measurement scale and units of a dominant environmental gradient by using non-linear models to fit plant frequency to a water-level gradient ranging from shallow ground water to standing water along the Platte River in central Nebraska, USA. Non-linear models, unlike polynomials, have coefficients that can be interpreted with a biological meaning such as population peak, optimum gradient position, and ecological amplitude. Sixty-three riparian grassland species had sufficient information to link their plant frequency to the water-level gradient. From among 10 water-level summary statistics evaluated for a subset of 22 species, the best plant-frequency response curves were obtained by using the growing season 10% cumulative frequency water level, followed closely by the growing season 7-day moving average high water level and two other high water-level statistics. This suggests that for Platte River riparian grasslands, high water levels are more influential than mean, median, or low water levels. Land-management practices (i.e., grazing, haying, and extended rest) affected six species by a change in frequency or a shift in position along the water-level gradient. Four general plant communities composed of species responding individually to the water-level gradient and other factors were identified for Platte River riparian grasslands: emergent, sedge meadow, mesic prairie, and dry ridge. Plant response curves are the first step toward predicting how plants responding to riparian-grassland water levels might also respond to river management.

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1170. Nitrogen and phosphorus dynamics and the fate of agricultural runoff.

Neely, R. K. and Baker, J. L.

In: Northern Prairie Wetlands/ Van der Valk, A.
Ames, Iowa: Iowa State University Press, 1989; pp. 92-131.
Notes: ISBN: 0813800374

Descriptors: wetlands/ cycling/ nitrogen/ soil/ agricultural chemicals/ phosphorus/ pollutants/ land types/ prairies
Abstract: Prairie wetlands are often contaminated by agricultural pollutants. Pesticides and NH₄-N are predominantly present in surface runoff, PO₄-P is transported mainly by sediment, and NO₃-N is lost mainly with subsurface drainage. Contaminants can be transferred to or retained in the soil, groundwater, atmosphere or biomass of microbes, plants and animals. Nitrogen is removed more effectively than phosphorus from marsh surface waters, and NO₃-N to a greater extent than NH₄-N. The most important removal processes seem to be denitrification for NO₃-N, sedimentation and precipitation for PO₄-P, and assimilation of inorganic nitrogen and phosphorus by emergent vegetation and microorganisms. Excessive nitrogen and phosphorus in wetlands increase nutrient accumulation in living plants, but accelerate nutrient release from decaying plants.

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1171. Nitrogen management strategies to reduce nitrate leaching in tile-drained Midwestern soils.

Dinnes, D. L.; Karlen, D. L.; Jaynes, D. B.; Kaspar, T. C.; Hatfield, J. L.; Colvin, T. S.; and Cambardella, C. A.
Agronomy Journal 94(1): 153-171. (2002)

NAL Call #: 4 AM34P; ISSN: 0002-1962

Descriptors: wetlands/ soil fertility/ nitrogen/ soil management/ leaching/ tile drainage/ groundwater/ groundwater contamination/ water pollution/ surface water/ water quality/ tillage/ crops/ soil organic matter/ hydrology/ air temperature/ precipitation/ monitoring/ crop rotation/ cover crops/ conservation tillage/ nitrification inhibitors/ biofiltration/ application rate/ literature reviews/ United States

Abstract: Balancing the amount of N needed for optimum plant growth while minimizing the NO₃ that is transported to ground and surface waters remains a major challenge for everyone attempting to understand and improve agricultural nutrient use efficiency. Our objectives for this review are to examine how changes in agricultural management practices during the past century have affected N in midwestern soils and to identify the types of research and management practices needed to reduce the potential for nonpoint NO₃ leakage into water resources. Inherent soil characteristics and management practices contributing to nonpoint NO₃ loss from midwestern soils, the impact of NO₃ loading on surface water quality, improved N management strategies, and research needs are discussed. Artificial drainage systems can have a significant impact on water quality because they behave like shallow, direct conduits to surface waters. Nonpoint loss of NO₃ from fields to water resources, however, is not caused by any single factor. Rather, it is caused by a combination of factors, including tillage, drainage, crop selection, soil organic matter levels, hydrology, and temperature and precipitation patterns. Strategies for reducing NO₃ loss through drainage include improved timing of N application at appropriate rates, using soil tests and plant monitoring, diversifying crop rotations, using

cover crops, reducing tillage, optimizing N application techniques, and using nitrification inhibitors. Nitrate can also be removed from water by establishing wetlands or biofilters. Research that is focused on understanding methods to minimize NO₃ contamination of water resources should also be used to educate the public about the complexity of the problem and the need for multiple management strategies to solve the problem across agricultural landscapes.

This citation is from AGRICOLA.

1172. Organochlorine pesticides and polychlorinated biphenyls in sediment and fish from wetlands in the north central United States.

Martin, D. B. and W. A. Hartman

Journal of the Association of Official Analytical Chemists 68(4): 12-17. (1985)

NAL Call #: 381 As7; ISSN: 0004-5756.

Notes: Other number: FR 31(3)

Descriptors: biomagnification/ polychlorinated biphenyls/ organochlorines/ pollution/ animals/ chromatography, gas/ fishes [metabolism]/ insecticides [analysis]/ polychlorinated biphenyls [analysis]/ soil pollutants [analysis]/ water pollutants [analysis]/ water pollutants, chemical [analysis]/ North America/ United States, north central

Abstract: Sediment samples collected in 1980-1982 from riverine and pothole wetlands at 17 locations in the north central United States were analyzed for organochlorine pesticides, certain of their metabolites, and polychlorinated biphenyls (PCBs). Concentrations were above minimum detection levels (5 ng/g of organochlorines and 20 ng/g of PCBs) in less than 4% of the samples taken. Fish samples taken at 9 of these 17 locations, and analyzed for the same compounds, showed a higher frequency of detectable contaminants. The most common compound found in fish was DDE, which was found in 51% of the samples at levels up to 512 ng/g. alpha-BHC was present at concentrations of 5 to 27 ng/g in 36% of the fish samples, and DDD was found at levels of 5 to 60 ng/g in 14%. Four other compounds, DDT, dieldrin, PCB, and trans-nonachlor, were detected in fish at relatively low concentrations in less than 10% of the samples. This survey, thus, indicated little contamination by organochlorine pesticides or PCBs in the wetland habitats of this region.

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1173. A review of wildlife changes in southern bottomland hardwoods due to forest management practices.

Wigley, T. Bently and Roberts, Thomas H.

Wetlands 14(1): 41-48. (1994)

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

Descriptors: southern USA/ wildlife abundance/ wildlife diversity

Abstract: One function of bottomland hardwood forests is provision of wildlife diversity and abundance. In this paper, we discuss the temporal and spatial changes in wildlife diversity and abundance often associated with forest management practices in bottomland hardwoods. Forest management activities alter forest composition, structure, and spatial heterogeneity, thereby changing the composition, abundance, and diversity of wildlife communities. Special habitat features such as snags, den trees, and dead and down woody material also may be

impacted by forestry practices. More research is needed to fully understand landscape-level impacts of forest management.

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1174. Sedimentation associated with forest road surfacing in a bottomland hardwood ecosystem.

Rummer, Bob; Stokes, Bryce; and Lockaby, Graeme
Forest Ecology and Management 90(2-3): 195-200. (1997)
NAL Call #: SD1.F73; ISSN: 0378-1127

Descriptors: bottomland hardwood system/ ecology/ forest road surfacing/ forestry/ miscellaneous method/ sedimentation/ water quality

Abstract: Access systems are a necessary element of resource production in bottomland hardwood sites. However, road building may have a detrimental effect on hydrologic function of the site. This report describes initial results of a study designed to examine the effect of different road surfacing treatments on water quality. Four surfacing treatments installed on two test roads included native soil, native soil with vegetative stabilization, 6 cm of gravel, and 15 cm of gravel over geotextile. During the first flooding season periodic sampling measured floodwater suspended sediments and location of erosion and sediment deposition within the road prism. Initial results suggest that sediment movement was confined to the road right-of-way, with no statistically significant sedimentation effects detected beyond the clearing limits of the road. The study is continuing for another field season.

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1175. Small mammal response to farming as practiced on the Franklin Island Wildlife Area.

Clawson, R. L. and Smith, J. W. Missouri Dept. of Conservation; MO W-013-R-39/Job 1/Study No. 69, 1985. 21 p.

Descriptors: wetlands/ cotton-rat/ food crops/ mammals/ mice, deer/ mice, harvest/ mice, white-footed/ mouse, house/ rodents/ species diversity/ state wildlife management areas/ tillage/ voles/ Triticum spp./ North America/ United States/ Missouri/ Howard County

Abstract: Objective was to determine small mammal populations in corn, soybean, and wheat fields on a Missouri Department of Conservation wetland area.

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1176. Sources and impacts of irrigation drainwater contaminants in arid wetlands.

Lemly, A. D.; Finger, S. E.; and Nelson, M. K.
Environmental Toxicology and Chemistry 12(12): 2265-2279. (1993)

NAL Call #: QH545.A1E58; ISSN: 0730-7268

Descriptors: wetlands/ arid environments/ contaminants/ agriculture/ irrigation/ drainage/ reviews/ agricultural wastes/ agricultural runoff/ water supply/ ecological effects/ environmental effects/ toxicity/ pollutants/ regulations/ Western/ environmental impact/ sources and fate of pollution/ freshwater pollution/ United States/ Northwest/ Central Valley/ High Plains

Abstract: Arid wetlands are being contaminated by subsurface agricultural irrigation drainage throughout the western United States. Historic freshwater inflows have been diverted for agricultural and municipal use, and remaining freshwater supplies are not sufficient to maintain the integrity of these important natural areas once they are

degraded by irrigation drainwater. Waterfowl populations are threatened in the Pacific and Central Flyways; migratory birds have been poisoned by drainwater contaminants on at least six national wildlife refuges. Subsurface irrigation drainage is the most widespread and biologically important source of contaminants to wetlands in arid regions of the country. The case history of poisoning at Kesterson National Wildlife Refuge in California and studies at other locations by the U.S. Department of the Interior provide detailed information on the toxicity of drainwater contaminants to fish and wildlife. Biogeochemical conditions favorable for the production of toxic drainage are found throughout the western states. Two actions seem necessary to prevent further drainage-related degradation of arid wetlands. First is a reduction in the amount of contaminants reaching these wetlands, possibly involving regulatory intervention through the National Pollutant Discharge Elimination System permit process. Second, a better balance must be achieved in the way fresh water is allocated between agriculture and wildlife. Federally subsidized water has supported agriculture at the expense of wetlands for nearly 100 years in the western United States. This trend must be reversed if arid wetlands and their fish and wildlife populations are to survive.

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1177. Speciation of soluble selenium in agricultural drainage waters and aqueous soil-sediment extracts using hydride generation atomic absorption spectrometry.

Zhang, Y.; Moore, J. N.; and Frankenberger, W. T.

Environmental Science and Technology 33(10): 1652-1656. (1999)

NAL Call #: TD420.A1E5; ISSN: 0013-936X

Descriptors: wetlands/ chemical speciation/ selenium/ drainage water/ agricultural runoff/ sediment pollution/ spectroscopic techniques/ analytical methods/ speciation/ spectroscopy/ drainage/ ponds/ water sampling/ atomic absorption spectroscopy/ agriculture/ oxidation

Abstract: There are few methods to effectively measure organic selenium [Se(-II)] in natural water and soil-sediment extracts. A method has been developed to determine organic Se(-II) in soil-sediment extracts and agricultural drainage water by using persulfate to oxidize organic Se(-II) and using manganese oxide as an indicator for oxidation completion. This method was used to determine Se speciation in eleven soil-sediments and four agricultural drainage water samples collected from the western United States. Results showed that organic Se(-II) can be quantitatively oxidized to selenite without changing the selenate concentration in the soil-sediment extract and agricultural drainage water and then quantified by hydride generation atomic absorption spectrometry. Recoveries of spiked organic Se(-II) and selenite were 96-105% in the soil-sediment extracts and 96-103% in the agricultural drainage water. Concentrations of soluble Se in the soil-sediment extracts were 0.0534-2.45 $\mu\text{g/g}$, of which organic Se(-II) accounted for 4.5-59.1%. Selenate is the dominant form of Se in agricultural drainage water, accounting for about 90% of the total Se. In contrast, organic Se(-II) was an important form of Se in the wetlands. These results showed that wetland sediments are more active in reducing selenate compared to evaporation pond sediments.

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1178. Timber harvesting considerations for site protection in southeastern forested wetlands.

Aust, W. M.

Technical Publication R8 20: 5-12. (Dec. 1994)

NAL Call #: aSD11.U5962; ISSN: 0749-5536

Descriptors: wetlands/ forests/ logging/ natural resource management/ environmental impact/ forest management/ hydrology/ water quality/ productivity/ history/ trafficability/ soil properties/ natural regeneration/ economic analysis/ equipment/ disturbed soils/ literature reviews

This citation is from AGRICOLA.

1179. A VSA-based strategy for placing conservation buffers in agricultural watersheds.

Qiu, Zeyuan

Environmental Management 32(3): 299-311. (2003)

NAL Call #: HC79.E5E5; ISSN: 0364-152X

Descriptors: agriculture/ freshwater ecology: ecology, environmental sciences/ pollution assessment control and management/ terrestrial ecology: ecology, environmental sciences/ benefit cost analysis/ applied and field techniques/ VSA conservation buffer scenario/ agricultural land conservation buffer interactions/ agricultural landscapes/ agricultural nonpoint source pollution/ agricultural watersheds/ available funding/ conservation buffers/ aesthetics improvement potential/ agricultural nonpoint source pollution reduction potential/ flood control improvement potential/ landscape biodiversity improvement potential/ location/ recreation potential improvement/ size/ terrestrial wild life habitat improvement potential/ cost effectiveness/ edge of field buffer scenario/ effectiveness/ environmental objectives/ field scale example/ hydrological processes/ landscape planning/ natural characteristics: hydrology, land use, cover, soils, topography/ riparian wetlands/ runoff generation/ streamside areas/ variable source area [VSA]: hydrology, identification, runoff generation contribution/ variable source area based strategy/ water quality

Abstract: Conservation buffers have the potential to reduce agricultural nonpoint source pollution and improve terrestrial wild-life habitat, landscape biodiversity, flood control, recreation, and aesthetics. Conservation buffers, streamside areas and riparian wetlands are being used or have been proposed to control agricultural nonpoint source pollution. This paper proposes an innovative strategy for placing conservation buffers based on the variable source area (VSA) hydrology. VSAs are small, variable but predictable portion of a watershed that regularly contributes to runoff generation. The VSA-based strategy involves the following three steps: first, identifying VSAs in landscapes based on natural characteristics such as hydrology, land use/cover, topography and soils; second, targeting areas within VSAs for conservation buffers; third, refining the size and location of conservation buffers based on other factors such as weather, environmental objectives, available funding and other best management practices. Building conservation buffers in VSAs allows agricultural runoff to more uniformly enter buffers and stay there longer, which increases the buffer's capacity to remove sediments and nutrients. A field-scale example is presented to demonstrate the effectiveness and cost-effectiveness of the within-VSA conservation buffer scenario relative to a typical edge-of-field buffer scenario. The results enhance the understanding of hydrological processes and interactions between agricultural lands and conservation buffers in

agricultural landscapes, and provide practical guidance for land resource managers and conservationists who use conservation buffers to improve water quality and amenity values of agricultural landscape.
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Wetlands as Agricultural Conservation Practices

1180. Breeding season bird use of recently restored versus natural wetlands in New York.

Brown, S. C. and Smith, C. R.

Journal of Wildlife Management 62(4): 1480-1491. (1998)
NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: environmental restoration/ habitat utilization/ breeding/ aquatic birds/ ecosystem management/ nature conservation/ breeding sites/ habitat selection/ plant populations/ ecological succession/ nesting/ Aves/ USA, New York/ birds/ restored wetlands

Abstract: Restoration of drained wetlands may contribute significantly to conservation of habitats for wetland birds, and state and federal agencies throughout the country rely on restoration and creation of wetlands to mitigate habitat losses to development. However, it is unclear if restored systems replace the habitat functions of natural wetlands, and few direct comparisons of multiple sites have been made. Three years after restoration, we compared the relative abundance and density of birds using 18 restored wetlands and 8 natural wetlands located in northern New York. Birds were classified as wetland dependent, wetland associated, or nonwetland. Abundances of species and of individuals in all 3 groups did not differ ($P > 0.05$) between restored and natural wetlands in any year. Densities of species in all 3 groups were consistently but not significantly lower at restored sites. Densities of individuals in the wetland-associated category and nonwetland category were significantly lower at restored sites for the first 2 years following restoration. Bird communities were significantly less similar between restored and natural sites than among restored sites. However, many of these differences may not persist following natural successional development of the restored sites. The long-term persistence of appropriate plant communities will determine whether or not restored sites provide bird habitat comparable to natural wetlands. The restoration program successfully increased the amount of bird habitat available in the region. However, hectare-for-hectare, the restored wetland sites did not replace the habitat functions of natural wetlands during the time period of this study.

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1181. Core terrestrial habitat for conservation of local populations of salamanders and wood frogs in agricultural landscapes.

Porej, D.; Micacchion, M.; and Hetherington, T. E.

Biological Conservation 120(3): 399-409. (2004)
NAL Call #: S900.B5; ISSN: 0006-3207

Descriptors: wetlands/ akaike information criterion/ fish/ glaciated plateau/ habitat preservation/ marbled salamanders/ predation/ red spotted newts/ smallmouth salamanders/ spotted salamanders/ tiger salamanders/ till plains/ wood frogs/ amphibia/ conservation/ North America/ United States/ Ohio/ *Notophthalmus viridescens* viridescens/ *Rana sylvatica*/ *Ambystoma tigrinum*/

Ambystoma maculatum/ *Ambystoma jeffersonianum*

Abstract: Pond-breeding amphibians require aquatic and terrestrial habitats to complete their lifecycles, and preservation of both habitats is necessary for maintaining local populations. Current wetland regulations focus primarily on aquatic habitats, and criteria to define critical upland habitats and regulations to protect them are often ambiguous or lacking. We examined the association between the presence of seven pond-breeding amphibian species and the landscape composition surrounding 54 wetlands located within the Till Plains and the Glaciated Plateau ecoregions of Ohio, USA. We quantified landscape composition within 200 m of the wetland ("core terrestrial zone") and the area extending from 200 m to 1 km from the wetland ("broader landscape context zone"). We constructed binary logistic regression models for each species, and evaluated them using Akaike Information Criterion. Presence of spotted salamanders (*Ambystoma maculatum*), Jefferson's salamander complex (*A. jeffersonianum*) and smallmouth salamanders (*A. texanum*) was positively associated with the amount of forest within the core zone. Presence of wood frogs (*Rana sylvatica*) was positively associated with the amount of forest within the core zone and the amount of forest within the broader landscape context zone. Presence of tiger salamanders (*A. tigrinum tigrinum*) was negatively associated with the cumulative length of paved roads within 1 km of the site, and presence of red-spotted newts (*Notophthalmus v. viridescens*) was negatively associated with the average linear distance to the five nearest wetlands. Overall salamander diversity was positively associated with the amount of forest within the core zone, and negatively associated with the presence of predatory fish and cumulative length of paved roads within 1 km of the site. Our results confirm the strong association between the structure of surrounding upland areas and amphibian diversity at breeding ponds, and stress the importance of preserving core terrestrial habitat around wetlands for maintaining amphibian diversity.

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1182. Creation and restoration of forested wetland vegetation in the southeastern United States.

Lea, R. and Clewell, A. F.

In: *Wetland Creation and Restoration: The Status of the Science.*

Covelo, Calif.: Island Press, 1990; pp. 195-231.

Notes: ISBN: 1559630450

NAL Call #: QH541.5.M3W462

Descriptors: artificial wetlands/ forest ecosystems/ swamps/ vegetation establishment/ water resources management/ wetland restoration/ hardwood/ oak trees/ plant populations/ planting management/ soil-water-plant relationships/ trees/ vegetation regrowth/ water resources development

Abstract: A wide variety of forest establishment techniques have been employed, some with initial success, but most are too new for critical evaluation. Most of these projects pertain to bottomland hardwood and cypress replacement. The two most significant trends in project activity have been the direct seeding of oaks on abandoned croplands and the replacement of all trees and sometimes the undergrowth at reclaimed surface mines. Project success depends largely on judicious planning and careful execution. The most critical factor for all projects is to achieve adequate hydrological conditions. Other important factors may include substrate stability, availability of adequate soil rooting volume and fertility, and the control of herbivores and competitive weeds. Success criteria for evaluating extant projects throughout the southeast need to place emphasis on the presence of preferred species and on the attainment of a threshold density of trees that are at least two meters tall. At that point, release from regulatory liability should be seriously considered. Several critical information gaps have been identified: (1) the silvicultural literature warrants further investigation of wetland tree establishment; (2) the conditions conducive to effective natural regeneration need to be elucidated; (3) techniques for undergrowth establishment should be developed; (4) baseline ecological and floristic studies need expansion for certain plant communities and regions; (5) research is needed to determine if successful forest replacement will provide the functional services of the original ecosystem; and (6) the time is ripe for a coordinated southeastern regional monitoring effort. (Author 's abstract)
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1183. Creation and restoration of riparian habitat in southwestern arid and semi-arid regions.

Johnson, R. R.; Mills, G. S.; and Carothers, S. W.
In: Wetland Creation and Restoration: The Status of the Science.

Covelo, Calif.: Island Press, 1990; pp. 351-366.

Notes: ISBN: 1559630450

NAL Call #: QH541.5.M3W462

Descriptors: artificial wetlands/ habitat restoration/ riparian land/ water resources management/ wetland restoration/ arid lands/ planting management/ research priorities/ riparian vegetation/ riparian waters/ soil-water-plant relationships/ vegetation establishment/ water resources development

Abstract: Though the literature on characteristics, values, and functions of riparian habitats in the arid and semiarid southwestern region of the United States is fairly extensive, few papers that pertain to its creation or restoration are available. Because these projects are so recent, evaluations of successes and failures are based on short-term results; long-term survival and growth rates are as yet unknown. In most cases, creation and restoration projects have involved the planting of vegetation and not the creation of conditions suitable for the natural regeneration of riparian habitats. Important considerations for riparian creation or restoration projects in the Southwest include: depth to water table; soil salinity and texture; amount and frequency of irrigation; effects of rising and dropping water tables on planted trees; protection from vandalism, off-road vehicles, and livestock; monitoring of growth rates as well as survival; and project design flexible enough to allow for major modifications. Because the creation and restoration of riparian habitats in the Southwest is new and mostly

experimental, more information is needed for virtually every aspect of revegetation. Two major questions that need to be answered are whether planted trees survive for more than a few years and reach expected sizes, and what ranges of planting parameters are most cost-effective. Specific information needs include the identification of: the most suitable watering regimes; suitable soil conditions for various tree species; long-term survival and growth rates; and effects of variable water levels on planted trees.

(Author 's abstract)

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1184. Creation, restoration, and enhancement of marshes of the northcentral Gulf Coast.

Chabreck, R. H.

In: Wetland Creation and Restoration: The Status of the Science.

Covelo, Calif. Island Press, 1990; pp. 125-142.

Notes: ISBN: 1559630450

NAL Call #: QH541.5.M3W462

Descriptors: artificial wetlands/ coastal marshes/ Louisiana/ water resources management/ wetland restoration/ Alabama/ diversion/ drainage engineering/ dredging/ environmental engineering/ levees/ marsh management/ Mississippi/ planting management/ salt marshes/ sedimentation/ Texas/ tidal marshes/ vegetation establishment/ water resources development/ weirs

Abstract: Coastal marshes of the northcentral Gulf Coast comprise almost 50% of the coastal marshes of the United States, excluding Alaska. Over 80% of the marshes in this region occur in Louisiana because of the influence of the Mississippi River. Salt, brackish, intermediate, and fresh marshes are well-represented within the region. Marshes have been created from dredged material deposited in shallow waters and by controlled diversion of river flow to direct sedimentation to specific sites. Plantings are seldom made on dredged material in Louisiana because of the large area to be planted and the fact that natural colonization is rapid. In fresher marshes, dredged material is left as levees after canals are dug that connect to salt water sources. Levees reduce salt water contamination and drainage of the marsh. Dredge material is usually planted in Texas, Mississippi, and Alabama to stabilize the material and hasten marsh development. In tidal marshes, construction of weirs is the most widely used enhancement practice. Impoundments provide a mechanism for controlling water depth and salinity and regulating plant growth. But impoundments can only be constructed in marshes that will support a continuous levee system. Freshwater diversion from the Mississippi River has been used on a small scale for marsh restoration and enhancement but could be used to improve vast areas of the rapidly deteriorating marshes of southeastern Louisiana. Precise information is needed on subsidence rates of individual localities for planning marsh creation and restoration projects. Methods for maximizing subdelta development and determining best use of dredged material are needed. (Author 's abstract)

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1185. Design and implementation of functional wetland mitigation: Case studies in Ohio and South Carolina.

McCuskey, S. A.; Conger, A. W.; and Hillestad, H. O. *Water, Air, and Soil Pollution* 77(3-4): 513-532. (1994)
Abstract: Wetland development offers the opportunity to replace and enhance ecological functions lost through permitted wetland impacts. Components necessary for the restoration and creation of wetlands are presented and examples of wetland construction are described to illustrate the application of wetland design. Land contours, top soil, hydrology and vegetation were manipulated to develop wooded wetlands at sites in Ohio and South Carolina. In Ohio, approximately 30 ha of former crop land/sod farm were modified to bring water from the adjacent creek onto the site and hold it to saturate soils for wetland development. A 2.8 ha ponding area and channels were constructed, berms were built to slow the exit of stormwater runoff, and trees were planted in spring 1994. The mitigation site lies adjacent to a park and high school, thereby also providing community benefits and wetland education opportunities. In South Carolina, 9.5 ha of an abandoned soil borrow pit were converted into wooded wetlands, hydrologically connected to an adjacent swamp. Native plants were removed from the 4 ha of isolated wetlands to be impacted, and were augmented with nursery stock to create the mitigation wetland. Monitoring of vegetation, hydrology and wildlife usage of the constructed system continues to document wetland development and success.

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1186. Designing constructed wetlands to remove phosphorus from barnyard run-off: Seasonal variability in loads and treatment.

Hill, C. M.; Duxbury, J. M.; Geohring, L. D.; and Peck, T. *Advances in Ecological Sciences* 11: 181-196. (2003)
NAL Call #: QH540.I67; *ISSN:* 1369-8273.

Notes: Special issue: Constructed wetlands for wastewater treatment in cold climates; Issue editors: Mander, U. and Janssen, P.

Descriptors: wetlands/ agricultural runoff/ farm wastes/ phosphorus removal/ costs/ dairy wastes/ wastewater treatment/ runoff (agricultural)/ dairy industry waste waters/ wastewater treatment processes/ industrial effluents/ water & wastewater treatment

Abstract: While constructed wetlands can be a cost-effective method for reducing the export of P from agricultural ecosystems, removal rates vary depending on the substrate, the climate, and the load of nutrients. The objectives of this research were to evaluate substrates that could improve soluble P removal in treatment wetlands, and to compare their efficacy both seasonally and under varying loading regimes. To compare four substrates for removing soluble P from dairy barnyard run-off, eight 55 m super(2) subsurface wetland cells were built on an 800-head dairy farm in Newark, NY, USA. The four media were (1) a fine loamy, mixed, mesic Glossic Hapludalf, (2) crushed limestone, (3) Norlite (lightweight coarse aggregates of fired shale), and (4) wollastonite (calcium metasilicate) mining tailings. Influent P concentrations in the growing season dropped to 2.9 mg/L, while concentrations in the dormant season rose gradually to a peak of 28.5 mg/L. Over 1.5 years, soil removed the most soluble P (53%), followed by Norlite (34%), wollastonite tailings (13%), and limestone (4%). No significant difference was found in percent

removal of soluble P across seasons, an indication that neither higher loads nor freezing conditions curtail removal of phosphorus from this wastestream. These results help demonstrate that subsurface flow wetlands are appropriate components of stormwater management systems on farms in cold temperate climates. Treatment rates are sustainable in winter even at very high P loads.

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1187. Forested wetlands.

Calhoun, Aram J.

In: *Maintaining biodiversity in forest ecosystems/* Hunter, Malcolm L. Cambridge, UK: Cambridge University Press, 1999; pp. 300-331.

Notes: ISBN: 0521631041

Descriptors: biodiversity/ ecology: environmental sciences/ ecosystem management/ management method/ forested wetlands/ hydroperiod/ book chapter

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1188. A guide to bottomland hardwood restoration.

Allen, J. A.; Keeland, B. D.; Stanturf, J. A.; Clewell, A. F.; and Kennedy, H. E.

Asheville, North Carolina: U.S. Geological Survey, Biological Resources Division//U.S. Department of Agriculture, Forest Service, Southern Research Station; USGS/BRD/ITR-2000-0011132 pp. General Technical Report SRS-40.

Notes: Information and Technology Report

NAL Call #: aSD143 .G46 no. 40

http://www.nwrc.usgs.gov/wdb/pub/diglib/bottomland_hardwood.htm

Descriptors: wetlands/ afforestation/ bottomland forests/ choice of species/ direct sowing/ forests/ nature conservation/ planning/ revegetation/ seedlings/ silviculture/ site preparation/ southeastern states of USA/ forests and forest trees/ biology and ecology/ silviculture and forest management/ biological resources/ plants

Abstract: During the last century, a large amount of the original bottomland hardwood forest area in the USA has been lost, with losses greatest in the Lower Mississippi Alluvial Valley and East Texas. With a holistic approach in mind, this manual describes methods to restore bottomland hardwoods in the lower Midwest, including the Lower Mississippi Alluvial Valley and the southeastern USA. Bottomland hardwoods in this guide include not only the hardwood species that predominate in most forested floodplains of the area but also the softwood species such as baldcypress that often co-occur. General restoration planning considerations are discussed as well as more specific elements of bottomland hardwood restoration such as species selection, site preparation, direct sowing, planting of seedlings, and alternative options for revegetation. We recognize that most projects will probably fall more within the realm of reforestation or afforestation rather than a restoration, as some site preparation and the planting of seeds or trees may be the only actions taken. Practical information needed to restore an area is provided in the guide, and it is left up to the restorationist to decide how complete the restoration will be. Postplanting and monitoring considerations are also addressed. Restoration and management of existing forests are included because of the extensive areas of degraded natural forests in need of rehabilitation.

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1189. Habitat use by mallards during spring migration through Central Iowa USA.

Lagrange, T. G. and Dinsmore, J. J.

Journal of Wildlife Management 53(4): 1076-1081. (1989)
NAL Call #: 410 J827; ISSN: 0022-541X

Descriptors: *Anas platyrhynchos*/ high energy seed/ food/ nighttime cover/ sheetwater wetland

Abstract: We studied the use of 455 seasonally flooded farmed basins (sheetwater wetlands) and 16 small emergent wetlands by migratory mallards (*Anas platyrhynchos*) in central Iowa during spring 1983-84. During daytime, sheetwater wetlands provided 19,530 mallard use days compared with 103 on the few remaining emergent wetlands. Mallards used larger (> 2 ha) versus smaller sheetwater wetlands, moist-soil or corn-vegetated wetlands more than emergent wetlands or soybean-vegetated wetlands, untilled wetlands more than conservation-tiller or plowed sheetwater wetlands, and sheetwater wetlands located farther from disturbance. Mallards used sheetwater wetlands during all daylight hours, but flew .ltoreq. 13 km to roost on larger emergent wetlands. A diversity of habitats appears necessary for spring migratory mallards: sheetwater wetlands provide food and high-energy seeds and emergent wetlands provide nighttime cover.

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1190. A handbook of constructed wetlands: A guide to creating wetlands for agricultural wastewater, domestic wastewater, coal mine drainage, stormwater in the Mid-Atlantic Region.

Davis, Luise; United States. Natural Resources Conservation Service; United States. Environmental Protection Agency. Region III; and Pennsylvania. Dept. of Environmental Resources.

Washington, D.C.: U.S. Department of Agriculture. (1995)
Notes: "This document was prepared by Luise Davis"--P. [2] of cover; Contents note: v.1. General considerations -- v.2. Domestic wastewater -- v.3. Agricultural wastewater -- v.4. Coal mine drainage -- v.5. Stormwater.

NAL Call #: TD756.5.D39 1995; ISBN: 0160529999 (v.1); 0160530008 (v.2); 0160530016 (v.3); 0160530024 (v.4); 0160530032 (v.5)

Descriptors: constructed wetlands---Middle Atlantic States--handbooks, manuals, etc/ sewage purification---handbooks, manuals, etc/ agricultural pollution---handbooks, manuals, etc/ coal mine waste---handbooks, manuals, etc/ storm sewers---handbooks, manuals, etc
This citation is from AGRICOLA.

1191. The importance of local and regional factors in predicting effective conservation: Planning strategies for wetland bird communities in agricultural and urban landscapes.

Whited, Diane; Galatowitsch, Susan; Tester, John R.; Schik, Karen; Lehtinen, Rick; and Husveth, Jason
Landscape and Urban Planning 49(1-2): 49-65. (2000)
NAL Call #: QH75.A1L32; ISSN: 0169-2046

Descriptors: wildlife management: conservation/ agricultural landscapes/ conservation effectiveness: local factors, regional factors/ urban landscapes/ wetland communities

Abstract: Wetland assessment techniques have generally focused on rapid evaluations of local and site impacts; however, wetland biodiversity is often influenced both by

adjacent and regional land use. Forty wetlands were studied in the Red River Valley (RRV), Southwest Prairie (SWP), and the Northern Hardwood Forest (NHF) ecoregions of Minnesota, USA, to assess the strength of association between local and landscape condition and avian community composition. We examined the relationship between bird assemblages and local and landscape factors (connectedness, isolation, road density, and site impacts). Landscape variables were calculated for three spatial scales at 500 m (79 ha), 1000 m (314 ha), and 2500 m (1963 ha). Connectedness and road density are important measures for predicting bird assemblages in both agricultural ecoregions (SWP and RRV). Connectedness and its relationship with wetland bird assemblages were most pronounced at the larger scale (2500 m), where the largest remnant patches can be discerned. In contrast, road effects on bird assemblages were most pronounced at the smallest scale (500 m). Wetland isolation corresponded to bird community patterns as well, but only in one ecoregion (SWP). In the urbanizing ecoregion (NHF), species richness was considerably lower than elsewhere but community patterns did not correspond to landscape variables. The focus of wetland conservation planning needs to shift from the site scale to the landscape scale to ensure that connection with the regional wetland pattern is accounted for, therefore, affording the best opportunity to successfully maintain wetland avian diversity.

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1192. Managing agricultural wetlands for waterbirds in the coastal regions of Louisiana, USA.

Huner, J. V.; Jeske, C. W.; and Norling, W.
Waterbirds 25(Special Publication 2): 66-78.
NAL Call #: QL671; ISSN: 1524-4695

Descriptors: agricultural wetlands/ artificial freshwater habitat/ coastal wetlands/ crawfish management/ crawfish ponds/ freshwater habitat/ gulf coastal plain/ land conservation programs/ migration/ riparian habitat
Abstract: Rice and/or crawfish are cultivated in over 225,000 ha of shallow earthen impoundments within 160 km of the Gulf of Mexico along the coast of Louisiana. The region includes both the Gulf Coastal Plain and Prairie and the Lower Mississippi River Valley. Annual loss of 4,475 ha of coastal wetlands in Louisiana due to subsidence, erosion, and rising sea level has significantly reduced desirable freshwater habitat in the region. The suite of resident, migrant, breeding, and wintering waterbirds depending on this region includes grebes, pelicans, cormorants, anhingas, wading birds, waterfowl, coots, rails, gallinules, shorebirds, gulls, terns, and kingfishers. These taxa utilize the artificial freshwater wetland habitat provided by the agricultural wetlands. Numerous other birds utilize riparian areas associated with these artificial wetlands. Crawfish ponds are especially valuable cool season habitat for predaceous waterbirds because they provide shallow water systems rich in invertebrate and small vertebrate prey during the period from mid-autumn through mid-spring when most rice fields are drained. Because most crawfish ponds are not drained until late spring or early summer, predictable, food-rich, shallow water waterbird habitat is available throughout the region when rice fields are being cultivated for rice production. Incorporation of crawfish management into government-sponsored land conservation programs should encourage land owners to sustain standing water habitat outside of program mandated

fill/drain requirements. Farmers could adjust the times when their impoundments are filled or drained to maximize benefits to many species, especially migrating shorebirds.

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1193. Reciprocating constructed wetlands for treating industrial, municipal and agricultural wastewater.

Behrends, L.; Houke, L.; Bailey, E.; Jansen, P.; and Brown, D.

Water Science and Technology 44(11-12): 399-405. (2001)
NAL Call #: TD420.A1P7; ISSN: 0273-1223

Descriptors: bioprocess engineering/ freshwater ecology: ecology, environmental sciences/ pollution assessment control and management/ waste management: sanitation/ agricultural wastewater treatment/ industrial wastewater treatment/ municipal wastewater treatment/ wastewater treatment method/ aerobic zones/ anaerobic zones/ biochemical oxygen demand/ contiguous cells/ denitrification/ fixed film biological reactor/ high strength animal wastewater/ hydraulic retention time/ mixed wastewater streams/ municipal/ domestic wastewater/ nitrification/ paired subsurface flow constructed wetlands/ reciprocating constructed wetlands/ reciprocation cycle time/ reciprocation depth/ reciprocation frequency/ redox potential: control/ substrate composition/ substrate size/ Tennessee Valley Authority [TVA]/ U.S. Environmental Protection Agency [U.S. EPA]

Abstract: Scientists at the Tennessee Valley Authority (TVA), and in collaboration with the U.S. Environmental Protection Agency (EPA), are continuing to develop and refine an innovative wastewater treatment system referred to as reciprocating subsurface-flow constructed wetlands. Reciprocation relates to patented improvements in the design and operation of paired subsurface-flow constructed wetlands, such that contiguous cells are filled and drained on a frequent and recurrent basis. This operating technique turns the entire wetland system into a fixed-film biological reactor, in which it is possible to control redox potential in alternating aerobic and anaerobic zones. Reciprocating systems enable manipulation of wastewater treatment functions by controlling such parameters as hydraulic retention time, frequency of reciprocation, reciprocation cycle time, depth of reciprocation, and size and composition of substrate. These improved wetland technologies have been used for treating municipal/domestic wastewater, high strength animal wastewater, and mixed wastewater streams containing acids, recalcitrant compounds, solvents, antifreeze compounds, heavy metals, explosives, and fertilizer nutrients. Results from selected treatability studies and field demonstrations will be summarized with respect to conceptual design and treatment efficacy.

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1194. Regional analysis of the creation and restoration of kettle and pothole wetlands.

Hollands, G. G.

In: *Wetland Creation and Restoration: The Status of the Science.*

Covelo, Calif.: Island Press, 1990; pp. 281-298.

Notes: ISBN: 1559630450

NAL Call #: QH541.5.M3W462

Descriptors: artificial wetlands/ environmental engineering/ glaciation/ hydrologic budget/ water resources management/ continental basins/ permeability/ potholes/ soil properties/ streams/ surface-groundwater relations/

water resources development/ watershed management
Abstract: Kettles are topographic basins created by a variety of glacial processes and occur randomly throughout glaciated regions. They are associated with both permeable and impermeable deposits. Kettle wetlands can have complex hydrologic types: those having no inlet or outlet streams, and those associated with surface water streams. Complex relationships of surface water, groundwater, water chemistry, and other hydrologic elements combine to create water balances. This has been documented in the Prairie Potholes region of the United States where site specific hydrologic research has been conducted. Creating kettle wetlands is similar to other types of freshwater wetland creation, except where unique vegetation and hydrology are involved and replication may be a complex, technical effort. Identification of limiting factors is critical to wetland creation. Typical factors important to kettle wetlands are: surface water hydrology, groundwater hydrology, stratigraphy, soils, and water chemistry. Depending upon the goals of the project, other limiting factors may include: nuisance animals, long-term maintenance/monitoring, lack of funds, and disposals of excavated soil. The primary concern in creating kettle wetlands is the establishment of the proper hydrology. This normally requires mid-course corrections in design during construction to establish proper post-construction hydrology. Critical needs include studies on microstratigraphy, geochemical processes, the properties of organic soil, and the details of hydrology.

(Author's abstract)

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1195. The use of macrophyte-based systems for phosphorus removal: An overview of 25 years of research and operational results in Florida.

Debusk, T. A.; Dierberg, F. E.; and Reddy, K. R.

Water Science and Technology 44(11-12): 39-46. (2001)
NAL Call #: TD420.A1P7; ISSN: 0273-1223.

Notes: Conference: 7th International Conference on Wetland Systems for Water Pollution Control 2000, Lake Buena Vista, FL [USA], 11-16 Nov 2000; Issue editors: Kadlec, R. H. and Reddy, K. R.; ISBN: 1843394073

Descriptors: wetlands/ United States, Florida/ water pollution control/ performance evaluation/ phosphorus removal/ macrophytes/ case studies/ reviews/ case study/ agricultural runoff/ wastewater treatment/ historical account/ United States, Florida/ water quality control/ water treatment/ freshwater pollution/ water pollution: monitoring, control & remediation/ wastewater treatment processes

Abstract: Phosphorus (P) removal from wastewaters and surface runoff using macrophyte-based systems (MBS) has been a topic of great interest in Florida for over 25 years. During this period, P removal by both treatment wetlands and floating aquatic macrophyte systems has been evaluated from both a research and operational standpoint. Several factors have contributed to the increased focus on the use of MBS for P removal. First, there exist no conventional technologies that can cost-effectively achieve the low outflow P concentrations required to protect the integrity of Florida's relatively pristine surface waters. Second, because MBSs typically provide some water storage, they can accommodate the wide ranges of flows typical for runoff sources such as agricultural drainage waters. Finally, many regions in Florida have sufficient area for deployment of the relatively land-intensive MBS technologies. The first P removal work in Florida was

initiated in the mid-1970s, and involved pilot-scale research on domestic wastewater treatment by natural wetlands. Parallel studies were performed with managed (periodically harvested) floating plant systems (i.e., *Eichhornia crassipes*) for tertiary treatment. Since that time, the range of operational systems that have been deployed include emergent macrophyte-based and forested wetlands, managed floating plant systems, and submerged macrophyte-based systems. Waters treated by MBS include domestic effluents, agricultural runoff and eutrophic lake waters. Phosphorus removal targets for MBS in Florida have been as low as 10 µg/L. In this paper, we summarize research and operational results for MBS in Florida over the past 25 years.

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1196. Vegetation similarity and avifaunal food value of restored and natural marshes in northern New York.

Brown, Stephen C.

Restoration Ecology 7(1): 56-68. (1999)

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

Descriptors: natural restored marsh comparisons: avifaunal food value, vegetation/ restoration ecology

Abstract: Measuring the success of wetland restoration efforts requires an assessment of the wetland plant community as it changes following restoration. But analyses of restored wetlands often include plant community data from only one time period. We studied the development of plant communities at 13 restored marshes in northern New York for 4 years, including 1 year prior to restoration and 3 years afterwards. Restored wetlands ranged in size from 0.23 to 1.70 ha. Four reference wetlands of similar basin morphology, soil type, and size (0.29-0.48 ha) that occurred naturally in the same area were studied as comparisons. Dike construction to restore hydrology disturbed the existing vegetation in some parts of the restored sites, and vegetation was monitored in both disturbed and undisturbed areas. Undisturbed areas within the restored sites, which were dominated by upland field grasses before restoration, developed wetland plant communities with lower wetland index values but comparable numbers of wetland plant species than the reference wetlands, and they lagged behind the reference sites in terms of total wetland plant cover. There were significantly more plant species valuable as food sources for wetland birds, and a significantly higher percent cover of these species, at the undisturbed areas of the restored sites than at the reference wetlands. Areas of the restored sites that were disturbed by dike construction, however, often developed dense, monospecific cattail stands. In general, the plant communities at restored sites became increasingly similar to those at the reference wetlands over time, but higher numbers of herbaceous plants developed at the restored sites, including food plants for waterfowl, rails, and songbirds. Differences in shrub cover will probably lessen as natural recolonization increases shrub cover at the restored sites. Natural recolonization appears to be an effective technique for restoring wetlands on abandoned agricultural fields with established plant cover, but it is less successful in areas where soil has been exposed by construction activity.

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1197. Wetland conservation and Ducks Unlimited: Real world approaches to multispecies management.

Tori, Gildo M.; Mcleod, Scott; Mcknight, Keith; Moorman, Thomas; and Reid, Frederic A.

Waterbirds 25(Special Publication 2): 115-121. (2002)

NAL Call #: QL671; ISSN: 1524-4695

Descriptors: biodiversity/ freshwater ecology: ecology, environmental sciences/ terrestrial ecology: ecology, environmental sciences/ wildlife management: conservation/ multispecies management/ applied and field techniques/ Ducks Unlimited/ biodiversity/ coastal wetlands/ development: agricultural, industrial, urban/ habitat degradation/ habitat loss/ hydrological modification/ integrated habitat based landscape management/ land conversion/ palustrine wetlands/ riverine wetlands/ sustainable ecosystems/ wetland conservation/ wetland management/ wetland restoration/ wetland associated uplands/ wildlife diversity

Abstract: Conversion and loss of coastal, riverine, and palustrine wetlands to agricultural, urban, and industrial developments have had significant impacts on waterbirds. Degradation of wetlands and associated upland habitats, and associated impacts on several duck and rail species are well documented. Wetland restoration and management are essential for wildlife diversity because of the magnitude of wetland destruction and hydrological modification that has occurred in most of the United States. Half of threatened and endangered species rely upon wetlands for some portion of their life cycle, underscoring the importance of wetlands to all wildlife. Ducks Unlimited, during its 65-year history of conservation programs, has restored, protected, and enhanced nearly 4.05 million hectares of wetlands and associated uplands in North America. Despite the accomplishments of Ducks Unlimited and its private, state, provincial and federal partners, the perception remains that our efforts benefit only waterfowl. However, wildlife inventories on Ducks Unlimited projects indicate benefits to more than 900 species. Herein, we promote an integrated, habitat-based landscape approach to wetland restoration and management, rather than individual species management, to achieve biodiversity and sustainable ecosystem objectives. We discuss the development of wetland restoration and management strategies for quality wetland complexes needed for waterbirds during their annual life cycles. Further, we underscore the importance of wetland management by our state, federal and private land partners to manage wetland complexes to provide high quality habitat for a wide array of wetland wildlife.

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