

New Publications



U.S. Department of the Interior
Fish and Wildlife Service
Research and Development

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Foreword

This is the fourth semiannual announcement of recent Research and Development publications, U.S. Fish and Wildlife Service.

You have been selected to receive this product announcement either as a result of a request made by you or someone on your office's staff, or because of your position in natural resource research or management. If you prefer not to receive future announcements please send us the mailing label and a note indicating that you wish to have your name removed from our publication announcement mailing list.

For this listing, publications are arranged by series and are listed sequentially as they were published.

How to Order

After each publication listing is an acronym in parentheses. This acronym identifies the organization which distributes that publication. A listing of these acronyms and the associated addresses is given below.

These publications are available free until the supply is exhausted; then you will be asked to purchase needed publications from the National Technical Information Service (NTIS) or the U.S. Government Printing Office.

When ordering a publication please identify the series name, number, author(s), and title. This will ensure a rapid and accurate response.

Source

LNFH	U.S. Fish and Wildlife Service Leavenworth National Fish Hatchery Leavenworth, WA 98826	NWRC	U.S. Fish and Wildlife Service National Wetlands Research Center 1010 Gause Boulevard Slidell, LA 70458
NERC	U.S. Fish and Wildlife Service National Ecology Research Center Information Management Services 2627 Redwing Road, Creekside One Fort Collins, CO 80526-2899	PUB	U.S. Fish and Wildlife Service Publications Unit Matomic Building, Room 148 Washington, DC 20240
NFRL	U.S. Fish and Wildlife Service National Fisheries Research Center—Leetown Box 700 Kearneysville, WV 25430	PWRC	U.S. Fish and Wildlife Service Patuxent Wildlife Research Center Laurel, MD 20708
NPWRC	U.S. Fish and Wildlife Service Northern Prairie Wildlife Research Center P.O. Box 2096 Jamestown, ND 58402	WY/CFWRU	U.S. Fish and Wildlife Service Wyoming Cooperative Fish and Wildlife Research Unit University of Wyoming Laramie, WY 82071
NWHRC	U.S. Fish and Wildlife Service National Wildlife Health Research Center 6006 Schroeder Road Madison, WI 53711		

Wildlife Research Report

Johnson, D.H., and A.B. Sargeant. 1977. Impact of red fox predation on the sex ratio of prairie mallards. *Wildlife Research Report* 6. 56 pp. (NPWRC)

The role that red fox predation may play in causing unbalanced sex ratios among dabbling ducks was examined. A simple model of mallard population dynamics, as affected by fox predation, hunting, and other mortality, was developed for the prairie pothole region of North Dakota during 1963-73. Validity of the model is assessed mathematically and by comparison with field studies.

Fish and Wildlife Research

Thompson, D.Q., R.L. Stuckey, and E.B. Thompson. 1988. Spread, impact, and control of purple loosestrife (*Lythrum salicaria*) in North American wetlands. *Fish and Wildlife Research* 2. 55 pp. (PUB)

Purple loosestrife is an erect, perennial herb of Eurasian origin that has spread across the wetlands of mid-latitude North America. It has permanently displaced native emergent vegetation and is a threat to riparian pastures and hay meadows. The origin, uses, history of spread, and ecology of this weed are reviewed. Its impact on North American habitats and native biota are described; recommendations for containment and control are made.

Fish and Wildlife Technical Report

Phillips, G.R., P.A. Medvick, D.R. Skaar, and D.E. Knight. 1987. Factors affecting the mobilization, transport, and bioavailability of mercury in reservoirs of the Upper Mississippi River Basin. *Fish and Wildlife Technical Report* 10. 64 pp. (PUB)

Factors affecting the bioavailability of mercury were studied in 10 reservoirs in the Missouri River Basin. In some reservoirs conditions were such that fish accumulated high mercury concentrations even when relatively low amounts of mercury were present in sediments and water. Reservoir conditions facilitating the bioavailability of mercury included upstream flooding and leaching of terrestrial sediments, high bacterial counts in the water, complete thermal mixing, low clay content and low concentrations of sulfur and iron and manganese oxides in bottom sediments, and relatively high pH and conductivity of the water.

Novara, A.N., J.F. Voelzer, and A.R. Brazda. 1987. Waterfowl status report, 1980. *Fish and Wildlife Technical Report* 11. 93 pp. (PUB)

Novara, A.N., and J.F. Voelzer. 1987. Waterfowl status report, 1981. *Fish and Wildlife Technical Report* 12. 99 pp. (PUB)

These are standard compilations of survey data provided by State, Federal, Mexican, and Canadian wildlife agencies. Specific survey information was derived from the 1980-81 midwinter waterfowl survey by flyway, the breeding and habitat surveys for 1980 and 1981 (United States and Canada), and the 1980 waterfowl harvest survey (United States) for the 1979-80 and 1980-81 waterfowl hunting seasons. Published under the same cover.

Tomlinson, R.E., D.D. Dolton, H.M. Reeves, J.D. Nichols, and L.A. McKibben. 1987. Migration, harvest, and population characteristics of mourning doves banded in the Western Management Unit, 1964-1977. *Fish and Wildlife Technical Report* 13. 101 pp. (PUB)

An analysis of banding data for mourning doves from the Western Management Unit (WMU) yielded data about habitats, hunting regulations, and harvest in the WMU; distribution and derivation of band recoveries in and from the WMU; distribution of mourning dove harvest in Latin America from the WMU; chronology of migration; survival and recovery rates; effects of hunting on WMU; chronology of migration; survival and recovery rates; effects of hunting on WMU dove populations; and an indirect estimate of the nationwide mourning dove population. Comparisons of these data were made with similar data from a companion study in the Central Management Unit.

Wildlife Leaflet

Higgins, K.F., L.M. Kirsch, H.F. Duebbert, A.T. Klett, J.T. Lokemoen, H.W. Miller, and A.D. Kruse. 1977. Construction and operation of a cable-chain drag for nest searches. *Wildlife Leaflet* 512. 14 pp. (NPWRC)

A list of materials necessary to build and use a 53-m long cable-chain drag is presented. Techniques are described for searching, finding, and marking nests in a typical area of grassland.

Fish and Wildlife Leaflet

Marking, L.L. 1987. Gas supersaturation in fishes: causes, concerns, and cures. *Fish and Wildlife Leaflet* 9. 10 pp. (PUB)

Millions of cultured and wild fish have been lost to gas bubble disease, which is caused by the supersaturation of air in water. Gas bubbles form in the bloodstream and visibly on external surfaces of fish and in lesions in mouth cavities and eye sockets. Extreme exposure leads to "popeye," disequilibrium, and death. Treatment of gas-supersaturated water by packed-column aeration, vacuum degassing, or oxygen injection alleviates the problem; oxygen injection into hatchery water efficiently removes nitrogen gas and increases dissolved oxygen to levels that may increase fish production.

Moore, B.R., and A.J. Mitchell. 1987. Conversions useful in fish culture and fishery research management. *Fish and Wildlife Leaflet* 10. 31 pp. (PUB)

These tables of conversions from metric to English and English to metric measurements, as well as to metric and English from other systems such as the British Imperial and troy, are primarily designed for use by fish farmers, fish culturists, and fishery technicians and scientists. The lists are compiled in the form the authors have found to be most useful. Also included are tables for conversion of Fahrenheit to Celsius temperatures, gallons to liters, and miles to kilometers.

Yasutake, W.T. 1987. Collection and preparation of fish specimens for histological examination. *Fish and Wildlife Leaflet* 11. 5 pp. (PUB)

Lemly, A.D., and G.J. Smith. 1988. Aquatic cycling of selenium: implications for fish and wildlife. *Fish and Wildlife Leaflet* 12. 10 pp. (PUB)

Selenium, a non-metallic trace element, is readily accumulated by aquatic organisms. The degree of mobility or cycling rate of selenium in an aquatic ecosystem will largely determine whether toxicity occurs and how long the environmental hazard remains. Because of its ability to bioaccumulate and cause adverse reproductive effects at low environmental concentrations, selenium should be recognized as a contaminant with the potential to severely impact fish and wildlife populations.

Resource Publication

Cortese, T.J., and B.A. Groshek. 1987. Selected research

publication series of the U.S. Fish and Wildlife Service, 1889-1985. *Resource Publication* 159. 163 pp. Indexes to selected research publication series of the U.S. Fish and Wildlife Service, 1889-1985. *Resource Publication* 159-Indexes. 45 pp. (PUB)

This annotated bibliography provides a detailed record of 10 selected research series publications produced by the U.S. Fish and Wildlife Service and its predecessor agencies in the Department of Interior and the Department of Agriculture. The author, species, and subject indexes are published under a separate cover.

Mayer, F.L., Jr., and M.R. Ellersieck. 1986. Manual of acute toxicity: interpretation and data base for 410 chemicals and 66 species of freshwater animals. *Resource Publication* 160. 579 pp. (PUB)

All acute toxicity data developed by the Columbia National Fisheries Research Laboratory (now the National Fisheries Contaminant Research Center), U.S. Fish and Wildlife Service, since 1965 were evaluated for quality, and a data base was established for 4,901 tests with 410 chemicals (mainly pesticides) and 66 species of aquatic animals.

Banks, R.C., R.W. McDiarmid, and A.L. Gardner. 1987. Checklist of vertebrates of the United States, the U.S. Territories, and Canada. *Resource Publication* 166. 79 pp. (PUB)

This checklist contains the scientific and English names of taxa from order to species of four classes of vertebrates: Amphibians, Reptiles, Birds, and Mammals. A single English name is given for each species to promote uniformity and to permit more precise communication among users. Species listed as Threatened or Endangered are noted.

Friend, M., and C.J. Laitman, editors. 1987. Field guide to wildlife diseases. Volume 1. General field procedures and diseases of migratory birds. *Resource Publication* 167. 225 pp. (NWHRC)

This is a heavily illustrated, practical handbook in two sections, general field procedures and diseases of migratory birds. It describes disease management for wildlife refuge personnel and explains specific bacterial, viral, fungal, parasitic, and toxic diseases, and their geographic distribution, field signs, gross lesions, diagnosis, control, and human health considerations.

Geissler, P.H., D.D. Dolton, R. Field, R.A. Coon, H.F. Percival, D.W. Hayne, L.D. Soileau, R.R. George,

J.H. Dunks, and S.D. Bunnell. 1987. Mourning dove nesting: seasonal patterns and effects of September hunting. *Resource Publication* 168. 33 pp. (PUB)

A nationwide State-Federal cooperative study was initiated in 1978 to examine effects of September hunting on nesting mourning doves. This study was designed to (1) determine the proportion of the annual total dove nesting activity and production that occurs in September and October, and (2) determine if survival rates of mourning dove eggs and nestlings are lower in zones where early September dove hunting is permitted than in zones where it is prohibited.

Kerpez, T.A., and N.S. Smith. 1987. Saltcedar control for wildlife habitat improvement in the southwestern United States. *Resource Publication* 169. 16 pp. (PUB)

Saltcedar, an introduced phreatophyte, is spreading throughout the southwestern United States, displacing native plants and habitats valuable to wildlife. For control, saltcedar must be killed and prevented from reinvading. Effective kill of more than 90% has been achieved by root plowing, chemical treatment, or by long-term flooding. Each method, alone or in combination, has specific requirements. Three case histories are described and guidelines for managing saltcedar are given.

Smith, G.J. 1987. Pesticide use and toxicology in relation to wildlife: organophosphorus and carbamate compounds. *Resource Publication* 170. 171 pp. (PUB)

More than 89 million acre-treatments of organophosphorus and carbamate pesticides are applied each year within the United States. These compounds are applied to agricultural lands, rangelands, and forests in every region of the country and in every State. Tabular information summarizing chemical characteristics and hazard evaluations is presented for 67 organophosphorus and 41 carbamate compounds.

Fish Disease Leaflet

McAllister, K.W., J.A. Mann, and L.C. McKenzie. 1987. Annotated bibliography of the diseases and parasites of striped bass. *Fish Disease Leaflet* 76. 16 pp. (NFRL)

Federal and State agencies are actively engaged in the production of striped bass to augment declining stocks in the Chesapeake Bay. In support of these efforts, this bibliography has been prepared to provide information

on infectious and noninfectious diseases of the species. The references are arranged alphabetically by author and year, numbered consecutively, and referred to by number in the subject index.

Bullock, G.L. 1987. Vibriosis in fish. *Fish Disease Leaflet* 77. 11 pp. (NFRL)

Vibriosis is a systematic bacterial infection of primarily marine and estuarine fishes caused by *Vibrio* bacteria; it is a major cause of mortality in mariculture operations. It sometimes occurs in freshwater species. Information is provided on etiology and diagnosis; clinical signs and pathology; virulence factors; host and geographic range; and control. An annotated bibliography is also provided.

Biological Report

Habitat Suitability Index (HSI) Models.

HSI models provide a review and synthesis of existing information for a species.

Gutzwiller, K.J., and S.H. Anderson. 1987. Habitat suitability index models: marsh wren. *Biological Report* 82(10.139). 13 pp. (NERC)

Armbruster, M.J. 1987. Habitat suitability index models: greater sandhill crane. *Biological Report* 82(10.140). 26 pp. (NERC)

Anderson, S.H., and B.M. Graves. 1987. Habitat suitability index models: snapping turtle. *Biological Report* 82(10.141). 18 pp. (NERC)

Prose, B. 1987. Habitat suitability index models: plains sharp-tailed grouse. *Biological Report* 82(10.142). 31 pp. (NERC)

Allen, A.W. 1987. Habitat suitability index models: barred owl. *Biological Report* 82(10.143). 17 pp. (NERC)

Rogers, L.L., and A.W. Allen. 1987. Habitat suitability index models: black bear, Upper Great Lakes Region. *Biological Report* 82(10.144). 54 pp. (NERC)

Suchy, W.J., and S.H. Anderson. 1987. Habitat suitability index models: northern pintail. *Biological Report* 82(10.145). 23 pp. (NERC)

Sousa, P.J. 1987. Habitat suitability index models: hairy woodpecker. *Biological Report* 82(10.146). 19 pp. (NERC)

Boyle, K.A., and T.T. Fendley. 1987. Habitat suitability index models: bobcat. *Biological Report* 82(10.147). 16 pp. (NERC)

Cook, M.F., and R.C. Solomon. 1987. Habitat suitability index models: muskellunge. *Biological Report* 82(10.148). 33 pp. (NERC)

Blumton, A.K., R.B. Owen, Jr., and W.B. Krohn. 1988. Habitat suitability index models: American eider (breeding). *Biological Report* 82(10.149). 24 pp. (NWRC)

McKenzie, P.M., and P.J. Zwank. 1988. Habitat suitability index models: black-bellied whistling-duck (breeding). *Biological Report* 82(10.150). 22 pp. (NWRC)

Lee, L.A., and J.W. Terrell. 1987. Habitat suitability index models: flathead catfish. *Biological Report* 82(10.152). (NWRC)

Jewett, S.C., and C.P. Onuf. 1988. Habitat suitability index models: red king crab. *Biological Report* 82(10.153). 34 pp. (NWRC)

Vana-Miller, S.L. 1987. Habitat suitability index models: osprey. *Biological Report* 82(10.154). 46 pp. (NERC)

Species Profiles

Species profiles provide literature summaries of the taxonomy, morphology, distribution, abundance, life history, and environmental requirements of selected marine species.

Hassler, T.J. 1987. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific southwest)—coho salmon. *Biological Report* 82(11.70). 19 pp. (NWRC)

Porter, J.W. 1987. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (south Florida)—reef building corals. *Biological Report* 82(11.73). 23 pp. (NWRC)

Facey, D.E., and M.J. Van Den Avyle. 1987. Species and environmental requirements of coastal fishes and invertebrates (north Atlantic)—American eel. *Biological Report* 82(11.74). 28 pp. (NWRC)

Eversloe, A.G. 1987. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (south Atlantic)—hard clam. *Biological Report* 82(11.75). 33 pp. (NWRC)

Stewart, L.L., and P.J. Auster. 1987. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (North Atlantic)—Atlantic tomcod. *Biological Report* 82(11.76). 8 pp. (NWRC)

Ogden, J.C., and R.C. Carpenter. 1987. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (south Florida)—long-spined black sea urchin. *Biological Report* 82(11.77). 17 pp. (NWRC)

Chew, K.K., and A.P. Ma. 1987. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Northwest)—common littleneck clam. *Biological Report* 82(11.78). 22 pp. (NWRC)

Barnhart, R.A. 1988. Species profiles: life histories and environmental requirements of coastal fishes and invertebrates (Pacific Southwest)—Pacific herring. *Biological Report* 82(11.79). 14 pp. (NWRC)

Eisler, R. 1988. Arsenic hazards to fish, wildlife, and invertebrates: a synoptic review. *Biological Report* 85(1.12). 92 pp. (PWRC)

This report briefly synthesizes technical literature on ecological and toxicological aspects of arsenic in the environment, with special reference to natural resources.

Armstrong, N.E. 1987. The ecology of open-bay bottoms of Texas: a community profile. *Biological Report* 85(7.12). 104 pp. (NWRC)

The structure and function of benthic communities in 10 Texas estuaries are examined by reviewing and integrating data from a number of past and ongoing studies. The key functions of the benthic system are production of biomass as food resources for higher trophic levels; bioturbation, which enhances nutrient regeneration; and nutrient regeneration itself.

Conner, W.H., and J.W. Day, Jr., editors. 1987. The ecology of Barataria Basin, Louisiana: an estuarine profile. *Biological Report* 85(7.13). 165 pp. (NWRC)

The Barataria Basin lies entirely in Louisiana between the natural levees of the active Mississippi River and the abandoned Bayou Lafourche tributary. It is characterized by a network of interconnecting water bodies that allows transport of water, materials, and migrating organisms throughout the basin.

Glaser, P.H. 1987. The ecology of patterned boreal peatlands of northern Minnesota: a community profile. *Biological Report* 85(7.14). 98 pp. (NWRC)

Reviews the ecological information available for patterned boreal peatlands in northern Minnesota, and describes the distribution of peatlands, the physical settings in which they exist, and the process leading to their development on the landscape.

Onuf, C.P. 1987. The ecology of Mugu Lagoon, California: an estuarine profile. *Biological Report* 85(7.15). 122 pp. (NWRC)

This report summarizes and synthesizes data on the ecological structure and functioning of the Mugu Lagoon estuary in southern California, including discussions of climate, hydrology, geology, physiography, biotic assemblages, and ecological processes and interactions.

Damman, A.W.H., and T.W. French. 1987. The ecology of peat bogs of the glaciated northeastern United States: a community profile. *Biological Report* 85(7.16). 100 pp. (NWRC)

This publication reviews the ecological information available for peat bogs in the glaciated northeastern United States, a region extending from the Canadian border to the Pocono Mountain area of Pennsylvania. Peat bogs depend on acidic, nutrient-poor water for development and usually occur in areas underlain by sand, gravel, or glacial till. The hydrologic characteristics and chemical composition of bogs influences both nutrient cycling and plant community development within bogs. This publication describes peat bogs, their distribution in the area under consideration, the physical settings in which they exist, and the types of bogs generally recognized. Hydrology, water chemistry, and the cycling of nutrients and other elements in peat bogs are discussed.

Turner, R.E. 1987. Relationship between canal and levee density and coastal land loss in Louisiana. *Biological Report* 85(14). 58 pp. (NWRC)

Nearly 1% of Louisiana's coastal land becomes water each year. This land loss affects everything from wildlife, fisheries, and recreation to the economy and culture. A part of this loss results from natural, unmanageable factors, but manageable factors are also responsible. This report discusses one of the manageable factors: canals and their dredged-material levees.

Mullan, J.W. 1987. Status and propagation of chinook salmon in the mid-Columbia River 1985. *Biological Report* 87(3). 111 pp. (LNFH)

Examines the status and propagation of chinook salmon (*Oncorhynchus tshawytscha*) associated with the Grand Coulee Fish Maintenance Project through 1985.

Bley, P.W. 1987. Age, growth, and mortality of juvenile Atlantic salmon in streams: a review. *Biological Report* 87(4). 25 pp. (PUB)

A summary and synthesis of published and unpublished information on the age, growth, and sources of mortality in juvenile Atlantic salmon in streams. The author also provides a synopsis of current data on the life history of Atlantic salmon during the juvenile portion of their life cycle.

McKenzie, L.C., V.J. Catrow, and J.A. Mann. 1987. Bibliography of publications of the National Fisheries Research Center—Leetown. *Biological Report* 87(5). 33 pp. (PUB)

This bibliography contains entries for all publications produced by the National Fisheries Research Center—Leetown between 1981 and 1985. Publications are listed under six possible categories: (1) Aquatic plants and their control, (2) Culture and propagation, (3) Physiology, genetics, and behavior, (4) Parasites and diseases, (5) Pollution and toxicology, and (6) Research and management.

Carney, L.D., C.L. Michael, G.A. Gould, and R. Ausness. 1987. Opportunities to protect instream flows and wetland uses of water in New Hampshire and Connecticut. *Biological Report* 87(6). 96 pp. (NERC)

One of a series of similar documents that provides a survey of state prerogatives and programs that may be used to protect the instream uses of water. These documents illustrate methods to protect instream uses within the context of existing laws and regulations.

West, R.L., and E. Snyder-Conn. 1987. Effects of Prudhoe Bay reserve pit fluids on water quality and macroinvertebrates of Arctic tundra ponds in Alaska. *Biological Report* 87(7). 48 pp. (PUB)

Drill mud wastes, together with other wastes from oil drilling operations, are typically stored in reserve pits, sometimes described as sumps. As a result of the need for discharges, the State of Alaska has allowed, since 1983, the permitted discharge of reserve pit fluids to

the tundra or to roads and pads, depending on the contents of the reserve fluid. This study was initiated to evaluate the impacts of intentionally and accidentally discharged reserve pit fluids on water quality and invertebrate populations in tundra ponds.

Farris, G.S., and J.R. Zuboy. 1987. Biological Report Style Manual. *Biological Report* 87(8). vii + 46 pp. (NERC)

This style manual for the Biological Report series of the U.S. Fish and Wildlife Service is a guide for authors, editors, and typists to use in preparing these publications. It is the sole basis for the series format and bibliography: supplemental guidelines for producing double-columned or reduced-sized copy may be provided by the editors as needed.

Dick-Peddie, W.A., J.R. Hardesty, E. Muldarin, and B. Sallach. 1987. Soil-vegetation correlation on the riparian zones of the Gila and San Francisco rivers in New Mexico. *Biological Report* 87(9). 29 pp. (NERC)

Documents the relationship between soils and vegetation in the riparian zone of the Gila and San Francisco rivers in southwestern New Mexico.

Trembly, T.L., and G.A. Gould. 1987. Opportunities to protect instream flows in Colorado and Wyoming. *Biological Report* 87(10). 91 pp. (NERC)

One of a series of similar documents for western and midwestern States that provides a survey of State prerogatives and programs that may be used to protect instream uses of water. These documents illustrate methods to protect instream uses within the context of existing laws and regulations.

Wilkinson, D.L., K. Schneller-McDonald, R.W. Olson, and G.T. Auble. 1987. Synopsis of wetland functions and values: bottomland hardwoods with special emphasis on eastern Texas and Oklahoma. *Biological Report* 87(12). 132 pp. (NERC)

Bottomland hardwoods are dynamic, productive systems that depend on intermittent flooding and moving water for maintenance of structure and function. This report focuses on the bottomland hardwoods of eastern Texas and Oklahoma, serving as an introduction and entry into literature concerning their functions and values. The text of the report is supplemented by a computerized bibliographic data base of relevant

articles. Diskettes containing the data base files are available, on request, for use on selected microcomputer data base management systems.

Hall, R.J. 1988. An annotated bibliography of field studies conducted on the Patuxent Wildlife Research Center: 1940-1987. *Biological Report* 88(2). 16 pp. (PUB)

This bibliography lists more than 200 works on subjects relating to natural environments on the Patuxent Wildlife Research Center. Appropriate annotations are included for most works. Most deal with aspects of wildlife ecology, but studies of parasites and diseases, environmental contamination, aquatic ecology, entomology, and related subjects are also included.

Miscellaneous

Sousa, P.J. 1987. Habitat management models for selected wildlife management practices in the Northern Great Plains. Bureau of Reclamation, Engineering and Research Center Report Number 87-11. (NERC)

This report describes the effects of selected management actions in the Northern Great Plains on habitat for the gadwall, blue-winged teal, sharp-tailed grouse, Baird's sparrow, gray partridge, and muskrat. Categories of management actions discussed include land acquisition (fee-title, easement), upland vegetation development (plant dense nesting cover, plant native grasses, woodland development), upland vegetation maintenance/management (prescribed burning), upland vegetation protection (grazing control), wetland development (construct seasonal wetlands), construct semipermanent wetlands (restore drained wetlands), and island construction (nesting islands). Information provided for each action includes the purpose, effects of the action, maintenance and management, labor and materials, and a model describing the action and selected habitat variables.

Meyer, M.I. 1987. Planting grasslands for wildlife habitat. U.S. Fish and Wildlife Service, Northern Prairie Wildlife Research Center. 12 pp. (NPWRC)

The purpose of this guide is to help landowners and wildlife managers establish and maintain healthy stands of seeded grasslands. Although these guidelines apply primarily to the prairie region of the upper midwest, they have general application to other areas with similar soil and moisture conditions.