

Best Management Practices for Rainwater Basin Wetlands

A Handbook Developed by
the Public Lands Workgroup of
The Rainwater Basin Joint Venture

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Introduction

North American Waterfowl Management Plan and Rainwater Basin Joint Venture

Waterfowl are the most prominent and economically important group of migratory birds in North America. Despite past efforts to preserve and manage waterfowl habitat, a continued net loss of breeding, migration and wintering habitat has resulted in alarming declines in the populations of many waterfowl species. These declines prompted the governments of the United States and Canada to adopt the North American Waterfowl Management Plan (NAWMP) in 1986. This plan, which has been expanded to include Mexico, serves as a challenge and a logical guide to the protection of waterfowl habitat in North America. The goal of the plan is to return waterfowl populations to levels that existed during the 1970s.

The NAWMP serves as a broad policy framework that describes the overall scope of requirements for management of migratory waterfowl and waterbirds in Canada, the United States and Mexico. The plan calls for the establishment of Joint Venture projects for each waterfowl habitat area of major concern in North America. Each Joint Venture will develop and implement region-specific wetland protection initiatives that contribute to the NAWMP goal.

Nebraska's Rainwater Basin (RWB) wetland area is identified by the NAWMP as a migrational waterfowl habitat area of major concern in North America. In 1991, the NAWMP Committee officially recognized the RWB as the eighth area in North America to receive Joint Venture status. The goal of the Rainwater Basin Joint Venture (RWBJV) is to restore and maintain sufficient wetland habitat in the RWB area to assist in meeting population objectives identified in the NAWMP. The three objectives are to:

- 1) Protect 25,000 acres of existing and restored wetlands;
- 2) Provide reliable supplemental water sources so that one-third of the basins provide habitat annually; and
- 3) Improve habitat on existing public wetlands to optimize waterfowl habitat on these areas.

Education and information transfer are critical to the success of the above goals. The preparation of this handbook by the Public Lands Workgroup is a result of this need. We hope that you will find it useful and stimulating. The authors believe that responsible wetland management requires both science and art skills and is both challenging and enjoyable. We welcome you to the club.

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I. Importance of Rainwater Basin Wetlands and Adjacent Uplands

Spring is a nutritionally critical time for ducks and geese. During this period, waterfowl accumulate body reserves necessary for the energetic requirements of the reproductive cycle. The mobility of waterfowl allows them to seek out areas with abundant and accessible food. At these key sites, called spring staging areas, waterfowl stop for extended periods to feed and rest before reaching the breeding grounds.

The Rainwater Basin area is recognized as essential spring staging habitat for millions of ducks and geese annually (USFWS and NGPC 1986, Gersib et al., 1989). This wetland and abundantly row-cropped agricultural area serves as spring staging habitat for virtually the entire mid-continent breeding population of white-fronted geese as well as an estimated 50 percent of the surveyed continental breeding population of mallards and 30 percent of the surveyed continental pintail breeding population.

Waste corn comprises a significant portion of the diet of geese and mallards while spring staging in Nebraska. Rainwater Basin wetlands, however, provide important nutrients essential for geese and mallard reproduction that are not found in corn. Other ducks, such as pintails, blue-winged teal, green-winged teal, American wigeon, and gadwalls rely heavily on wetlands to provide nearly all food values. Further, wetlands provide secure loafing areas and roost sites critical for the efficient deposition of nutrient reserves. These nutrients, stored as body fat during spring migration, influence clutch size and female survival during laying and incubation in arctic and sub-arctic nesting geese. Nutrient reserves accumulated by ducks during spring migration are also of critical importance during the nesting season.

The RWB area has historically provided important fall migration and production habitat for waterfowl. Wetland habitat destruction or alteration has resulted in a substantial loss to these wildlife values. Presently, this area serves as a secondary pairing site for pintails and green-winged teal during migration while adding an estimated 10,000 ducks to flight stage annually in years with normal to above normal water conditions. Riparian areas with cavity bearing trees provide production habitat for wood ducks, a species which is expanding its range.

The value of RWB wetlands is not limited to providing benefits to waterfowl. The endangered whooping crane and bald eagle are regularly observed using these wetlands during both spring and fall migration. Confirmed whooping crane sightings recorded since 1942 indicate that these wetlands have one of the highest frequency of use-days of any migratory wetland habitat in the Central Flyway. Further, this wetland area serves as migration habitat for large numbers of shorebirds and wading birds. Many non-game migratory bird species also use the RWB wetlands, including Neotropical migrants, and short distance migrants.

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Characterization of Wetland and Upland Habitats: Wetland Habitats

Wetlands in the Rainwater Basin were formed by the wind approximately 25,000 years ago. After being gouged out by the wind they filled with clay particles forming a soil layer that prevents water movement through it. Because of these geological characteristics, most wetlands in the Rainwater Basin have common features. They vary in size from less than an acre to over 500 acres. They are broad, flat, generally very shallow with only small percentages of the basin more than three feet deep. The south shorelines generally have more gradual slopes than northern shorelines due to weathering from wave action from prevailing north winds.

Soil types in the wetlands are generally broken into four types. The soils under the most permanent water regimes is the Massie soil. The wetland type associated with this soil is a semi-permanently flooded marsh often dominated by a plant community consisting of cattails and roundstem bullrush. When dry, the areas without plant cover are generally mudflats and are the deepest portion of the wetland. The soil type in slightly shallower areas is the Scott soil. Wetlands associated with this type are seasonally flooded and support a plant community dominated by smartweed.

The soil type in the areas with less depth than Scott is the Fillmore soil. Wetlands associated with this soil are temporarily flooded and support plant communities of wild millet, smartweed, rushes and small sedges. When dry, these areas are usually dominated by an upland forb community of annual weeds such as ragweed, pigweed and sunflower.

The soil flooded the least is the Butler soil. This soil area is generally inundated only in high water events and then only for short time periods. Butler soils are dry enough in nearly all years to allow cropping.

Upland Habitats

Upland habitat is generally one of three types: cropland, grassland or woodland/brush habitat. The most abundant of these types in the RWB is cropland. Common crops consist of corn, sorghum, winter wheat, soybeans and smaller quantities of alfalfa. An average of 73 percent of all acreage in the 17 Rainwater Basin counties is cropped, varying from a low of 44 percent in Franklin county to a high of 86 percent in York county. An average of 59 percent of all cropped acreage in basin counties is irrigated, varying from

a high of 93 percent in Phelps county to a low of 21 percent in Nuckolls county. On areas managed for wildlife, only a small amount of cropland exists, usually as food plots for resident wildlife use during winter months.

Grassland in the RWB area was historically tall grass: warm-season prairie in the eastern counties and mid-grass prairie in the western counties. Tall grass prairie is dominated by big bluestem, Indian grass and switchgrass stands. Most tall grass prairie on areas managed for wildlife has been replanted as original stands were often farmed. As a result, very little virgin prairie exists and many prairie flowering plant species are missing. Depending upon past management, grasslands may be dominated by cool season grasses such as Kentucky bluegrass or smooth brome. Cool-season grasses will generally out-compete warm-season varieties and dominate areas that have been over-rested or overgrazed for a number of years.

Woodland/brush habitat is found in two types of areas. The riparian area is natural forest habitat, though timber amounts are probably much greater today than historically. These riparian areas, both permanent and intermittent streams, are typically dominated by willow and cottonwood on the wet sites, and by green ash, boxelder locust and occasional oaks in higher sites. Often the most extreme upper parts of the drainages will be dominated by brush stands with wild plum being the dominant species.

The other major forest habitat is planted shelterbelts of various width. These vary from large diverse multi-row habitats generally containing rows of shrubs along the outside and deciduous and evergreen trees in the middle, to single row belts. The most common evergreen is the eastern red cedar which commonly escapes into surrounding grassland areas. Russian olive also escapes into grassland areas. Many of these forest species are capable of growing in or around wetland sites and occur in most basins.

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Characterization of Habitat Needs by Waterfowl, Endangered Species, Wading and Shorebirds and Resident Wildlife

Habitat Needs of Waterfowl

Waterfowl in the RWB area need migration habitat. Water areas are for roosting, loafing and feeding. Thermal cover is also necessary during inclement weather. Wetland habitats provide roosting, foraging and loafing habitats only if water is present.

Wetlands have large quantities of invertebrates and plant materials, including seeds, tubers and herbaceous material that is used by migrating waterfowl. Cropland provides large quantities of waste grain which is heavily used by grain feeding ducks and all geese species.

To reemphasize migration needs as stated above, optimum migration habitat in the RWB should have:

- 1) Wetlands with open water areas over more than half of their area. Shallow wetland areas should be dominated by food producing plants such as wild millet and smartweed;
- 2) Adjacent upland cover should be grassland that protects the wetland from erosion and siltation and provides nesting cover during summer months; and
- 3) Other surrounding upland areas should provide abundant waste grain for food and energy requirements in spring and fall migration periods.

Habitat Needs of Endangered Species

Rainwater Basin wetlands provide migration habitat for whooping crane, peregrine falcon and both migration and wintering habitat for bald eagles. Whooping cranes use basins that are flooded and have open habitats in which the vegetation does not present a visual barrier. They roost in water depths of 12 inches or less. Bald eagles are attracted by abundant waterfowl populations and peregrine falcons prey on smaller ducks and shorebirds. These latter two species use the areas as long as abundant prey species are available.

Habitat Needs of Wading and Shorebirds

Wading birds need wetland foraging, loafing and roosting sites. Species most common in this area are the great blue heron and black-crowned night herons, snowy and great egrets, white pelicans, Franklin's gulls, sandhill cranes and American bitterns. More unusual species are the white-faced ibis, black terns and green herons. These species forage in shallow water for fish, amphibians, snails, crustaceans and large aquatic insects. Rainwater Basin wetlands provide breeding habitat for rails and grebes and wetlands which have good stands of cattail and bullrush and adequate forage species are capable of providing breeding habitat for night herons, egrets and ibises. Sandhill cranes spend mornings and evenings in corn fields feeding on waste grain, mid-days loafing in shallow water sites foraging for invertebrates and nights roosting in wetlands at water depths less than 12 inches.

Shorebirds need shallow water, open mudflats or other bare soil areas with seeds and aquatic insects for food. Rainwater basins are used by shorebirds primarily during spring and fall migration. Migration habitat quality varies from year to year. The best habitat is provided during the spring in mudflats resulting from natural drawdowns in April and May and during high water conditions in fall months when surrounding croplands are flooded.

Habitat Needs of Other Non-game Birds

Other non-game birds are a highly diverse group with diverse habitat needs. Three general categories exist:

- 1) Migratory species traveling through the RWB need food and cover during spring and fall migration;
- 2) Migratory breeding species need habitat suitable to successful reproduction; and
- 3) Resident species and short distance migrants need breeding habitat and have year-long cover requirements. Most habitat needs are met by native prairie, emergent wetland plant communities and diverse cover types in close proximity.

Habitat Needs of Resident Wildlife

Resident wildlife need a variety of habitats depending upon species. White-tailed and mule deer use the basins and riparian areas as winter cover and feeding areas, although they spend much of their time in cropland during the summer. Furbearer food supply is concentrated in grasslands, riparian areas and wetlands. They use non-cropped areas year-round.

Ring-necked pheasants and other game birds use the grassland, riparian areas and shallow temporary marshlands as nesting cover and shelterbelts and dense marsh areas as winter thermal cover. They also spend much of the summer in cropland. Other species such as rabbits, squirrels, mice, reptiles and

amphibians are nearly restricted to grassland, riparian and marsh edges for their entire year long needs.

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Wetland Management - Getting Started

The first question to ask yourself is, "What specifically do I want to achieve in managing my wetland?" A private land owner may want a good hunting area, increased livestock forage or increased fur production. Public land managers frequently look for more specific results such as increased feeding and resting habitat for migrating white-fronted geese, reduced waterfowl disease losses or improved upland game habitat and harvest.

Whatever your goals, you should begin by writing a clear statement of your objectives. This will set the direction of your work plan, keep your energies focused, and assist you in evaluating your management efforts. Be prepared to refine your objectives after answering the next two questions.

The second question is, "What resources are available to me?" These resources include money, labor, equipment, time, information and natural resources. Many management practices are inexpensive and easy to implement in a broad variety of areas. Others are more costly, require intensive management or special equipment or have narrow windows of time in which they can be successfully used. Technical advice and financial assistance are available through a variety of government and private conservation groups. Sources of help are listed in [Appendix A](#).

The next question is, "What problems must be solved to achieve my objectives?" To answer this question, it may be necessary to consult other texts or natural resource specialists. While specific problems require specific solutions, in general it is best to focus your attention and efforts on your limiting factor. A limiting factor is what you have the least of and that if it was increased, would increase your benefits.

Finally, "What management practices are likely to solve the identified problems?" This information was designed to familiarize you with commonly used habitat management practices and to help you choose the most appropriate practice for a given situation.

Once you have answered the above questions you can develop a work plan that will be the basis for how, what, when and where your management practices will be applied. It is your responsibility to ensure that your activities are in compliance with federal, state and local regulations. [Appendix B](#) lists the most common laws and regulations addressing wetland alterations and water use. Once you've complied with these regulations, you're ready to manage the land.

This process of getting started can be lengthy, but it will save time, money and frustration later. The personal satisfaction derived from a well thought-out plan and a well managed wetland is worth it.

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Management for Migratory Waterfowl - Wetland Management

A. Water Management of Rainwater Basin Wetlands

A considerable variety of techniques, practices and management options exist for the wetland manager. A knowledge of relevant ecological facts is in order before presenting options.

The average rainfall in the RWB area is approximately 25 inches/year. Average evaporation is approximately 46 inches/year. This means that insufficient water is a major problem facing wetland managers. Evaporation is greatest during the growing season. The resulting bare soil areas are tremendously productive and grow dense stands of emergent vegetation. This abundant growth can hinder water and waterfowl management.

Watershed conditions have changed considerably from the early 20th century. Changes in drainage patterns by roads, reuse pits, terraces and other improvements have resulted in considerably less runoff into the basins. When runoff occurs after heavy summer rains, large amounts of silt are carried into the wetland. An effective wetland manager must have plans to deal with insufficient water and siltation.

Maximizing Shallow Water

The first step is to insure that you are managing the water you have as effectively as possible. You want the maximum amount of shallow water (less than three feet deep). Large pits may be filled in, or have low-level dikes constructed around them, to regulate when water enters the pit. Another possible way to spread water over more area is to sub-impound the wetland. This is done by constructing dikes at three foot contour intervals. These dikes should have water control structures such that water freely moves when necessary and so that individual impoundments can be independently managed. Care must be taken to preserve historical drainage patterns and to not cause flooding of surrounding land.

Water movement within the wetland impoundments is most effectively and cheaply done by gravity flow, however lift pump facilities can also be used to transfer water from one impoundment into another. In order for any sub-impounding of wetlands to be effective, a good system of dikes and appropriate ditches must be designed, built and maintained.

Controlling Siltation

Controlling siltation is done most effectively by three methods. First, a properly managed watershed will have minimal erosion. However, if not possible to eliminate erosion, the wetland edge should be vegetated with permanent, well-managed grassland. A dense stand of grass will stop shoreline erosion and considerably reduce sheet erosion from upland areas.

The third method entails construction of small silt basins at major water delivery points such as ditches and streams. The purpose of basins is to slow water down and cause silt to drop out in these areas. They are periodically cleaned out and silt can be put back on the upland from where it came. Basins are usually 20'-x-20' areas that are three to four feet deep at the point where the water reaches the wetland edge. A series of silt basins can be built if siltation is severe.

Supplemental Water

Assuming you have done everything reasonable and practical to manage water effectively and you decide you still don't have enough water, you can now plan to supplement your water supply. There are two possible ways to do this. The first is to obtain additional surface water from an irrigation district or from surrounding landowners. Both of these will require a ditch or pipeline to carry water to your property.

The second -- and most common method in most of the RWB area -- is to supplement your water supply with well water. Ideally, the well should be located above the wetland and should have enough capacity (at least 800 gallons per minute) to make it economical to pump. Depending upon capacity, depth from

which you must pump, type of energy used and maintenance costs, well water will cost from \$8 to \$25 per acre-foot.

In some cases, water supplies may also be increased by planting shelterbelts to increase snow accumulation and resultant runoff into the wetland. Another possibility is to divert water from road ditches or other intermittent drainages into the wetland.

Timing

The last aspect of water management is deciding when the wetland should be flooded or drawn down. Water for migration and wintering habitat should be available from October 1 to April 15. Holding water until April 15 will provide whooping cranes, shorebirds and other migratory birds habitat as they migrate through in early spring. Providing summer water generally is cost-prohibitive due to high evaporation and will also encourage the growth of undesirable dense vegetation.

Drying will occur naturally in late spring and summer, but if you have impoundments that can be drawn down artificially, this should be done slowly, starting in mid-April. This will promote growth of smartweed, wild millet and other moist-soil plants which provide abundant food for migrating waterfowl. Sophisticated wetland managers can directly control wetland plant communities by varying water depths in summer and by changing the timing of drawdowns. Different species germinate at different temperature ranges. However, you must also be aware that you are managing the lowest spots in the watershed and that these areas are more severely affected by wet weather. There will be times when natural forces will make conditions beyond the manager's control.

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B. Vegetation Management of Rainwater Basin Wetlands

Maximizing Available Water

Many wetland areas have vegetation too dense to allow waterfowl to use them. Management techniques that reduce the density of vegetation need to be targeted to the needs of each specific wetland. Techniques available include grazing, haying, mowing, discing, burning, tree clearing and herbicide application. Many of these can be used singly or in combination for different management objectives. Trade-offs can occur where one wildlife species benefits more than another. Effective wetland managers recognize these trade-offs.

Livestock Grazing

Controlled livestock grazing can be an effective and inexpensive management tool for altering the plants and soils of wetland areas. livestock can be used to decrease undesirable dense stands of vegetation; compact and seal wetland soils; disturb soil for use by shorebirds or for seedbed preparation; accelerate nutrient recycling; and increase interspersed and vegetation diversity. This management tool can even turn a profit because the vegetation is converted into a marketable product by grazing animals. The nutritional value of wetland plants is similar to, or slightly lower than upland forage. Nutritive value and palatability of these plants tends to be highest in spring and declines throughout the year.

Grazing management is accomplished by controlling the kind, number and density of animals and the season, duration, distribution and frequency of grazing.

The benefit to migratory waterfowl derived from controlled wetland grazing is an increase in open water in wetlands that are blanketed by emergent vegetation. These openings are accomplished as livestock reduce the height and density of excessive growth through grazing and trampling. Wetlands dominated by stands of smartweed, barnyard grass, docks, spikerushes, cattails and bullrushes are grazed effectively from July to September after natural drawdowns have occurred. Reed canary grass, a quality livestock forage, can be grazed earlier, from April 15 to May 15, and later in the fall if the purpose is to reduce this species. Usually for optimum migratory use, the wetland should have more than 50 percent of the vegetation removed.

Fencing is typically used to concentrate or exclude livestock. Temporary fences can be creatively used to create openings of different sizes and patterns to increase waterfowl use and recreational hunting opportunity. On large management units, temporary or permanent fencing should be installed to create several pastures. Grazing can be rotated to provide diverse vegetation densities. Temporary fences can be used to separate grazing periods on upland and wetland.

Livestock can also be encouraged to use and congregate on particular areas by selective placement of salt, mineral, supplemental feed, water facilities or shade. Prescribed burning has also been used to encourage livestock to graze a target area.

Discing

Discing can reduce dense stands of cattail, sedge, bullrush or canary grass and replace these areas with desirable seed-producing plant communities. Discing can create open water areas to increase migratory waterfowl and shorebird use and can provide traditional benefits of weed control.

Wetland discing is restricted to dry wetlands. If you have stands of undesirable vegetation, discing will help whenever you can accomplish it. Desirable results have been achieved from early spring and late summer discings. A heavy disc/plow is needed to turn over dense stands of cattail or bullrush. The heavy mat of vegetation will prevent most lighter discs from penetrating into the ground. If a heavy disc/ plow is not available, discing should be conducted after burning or mowing.

The desired action is to turn cattail tubers and roots over and let them dry for six weeks to two months, effectively killing the plant. At the same time, a bare soil situation is created that allows plants such as smartweed, wild millet, spikerush, arrowhead and a variety of other desirable moist-soil species to germinate and grow. These species are highly palatable to waterfowl if flooded during migratory periods.

Site characteristics and the rate of undesirable vegetation re-invasion will determine how often to use this tool. In most areas every three to four years will probably be sufficient. Wetlands will provide shorebird habitat if at least some portion of the wetland is disced every year.

Mowing

Mowing is used to provide open areas within wetlands. As with discing, the practice is conducted during dry conditions. Because root disturbance does not occur with mowing, all benefits derived are annual. Mowing every year achieves desired results.

A variety of different types of openings can be created using mowers. Time, type of mower and wetland conditions are the common limitations. Mowing strips that connect a quarter- to half-acre open circular areas creates attractive areas for duck species. Open areas should be at least five acres in size to attract

geese. Placement of mowed areas will influence use by waterfowl. Areas that receive high disturbance, such as roadsides, should be avoided. More than one opening will increase bird use.

In rare instances, mowing of cattails and bullrush followed by spring flooding with 18 inches of water above mowed areas for most of the growing season will kill these plants by denying them oxygen. Besides the above uses, mowing can help manage noxious weeds, control invading trees and prevent other undesirable plants such as cocklebur, aster and marehail from setting seed and dominating temporary wetland zones.

Haying

Haying provides many of the same benefits as mowing. The only practical difference is that some economic return is received by using the forage elsewhere. RWB wetlands generally do not produce high-quality hay. Reed canary grass produces its best hay when harvested prior to June. If waterfowl or upland game nesting is desired, haying should be delayed until after July 15. Haying in September will provide open areas for spring migration.

Burning

Controlled burning can be used to reduce wetland vegetation and to stimulate new growth. Burning avoids the problem of equipment use in water. The fire will travel over wet areas if vegetation is dense enough. Adequate firebreaks should be established before burning. County burn permits should be acquired and a simple plan prepared so that all participants understand procedures and know what to do if the fire escapes or performs unexpectedly. Burning is a valuable and useful technique, but must be used with caution and only after adequate preparation.

Wetland burning is easiest and most effective when done in February and March. By removing above-ground plant material, the wetland is opened for spring migration when early plant greenup provides attractive foraging areas. Plant growth is usually more vigorous due to the release of available nutrients and reduced competition for sunlight after the fire. Spring burns can control invading red cedars and grazing and haying can be used with favorable results after burning. In order to set back deciduous trees, the fire must be quite hot, usually requiring a late summer or fall burn. Controlling fires during these seasons is very difficult and generally not practical.

Burning should always be done with the cooperation of surrounding landowners, especially in critical seasons. It is also best to insure that some wetland or adjacent upland cover remains for wildlife use on the area.

Tree Clearing

Wetlands may have been invaded by cottonwood, willow, elm, cedar or other woody species. Historically, these species were not present in RWB wetlands. Their presence causes four problems:

trees reduce available wetland area; cause a visual obstruction which is undesirable to most waterfowl species; trees use more water than herbaceous vegetation and cause the wetland to be drier; and they provide perch and nest sites for raptors.

Trees less than three inches in diameter are most easily removed by using a brush mower. Haying, grazing, burning or chemical application can prevent trees from returning once they've been mowed. Treating stumps with an approved chemical prevents re-sprouting. Stumps should be cut as close to the

ground as possible to provide for future use of mechanical equipment. Using the logs for firewood, pallets or other uses may be economically beneficial and will reduce effort expended to pile and burn downed material. Piling of trees in the wetland requires a Section 404 permit ([Appendix B](#)).

Herbicide Application

Herbicide application is another technique that can be used to remove undesirable vegetation and manipulate plant communities. The most widespread use of herbicides in wetlands is for controlling solid stands of cattail or bull rush. Glyphosate is frequently used. Applications usually provides control for three to four years.

Control of noxious weeds is required by state law. One method of controlling noxious weeds is by using an approved over-water broadleaf weed control herbicide. Discing and mowing provide alternative methods of managing these problems. **Herbicides are recommended only as a last resort.** Only registered chemicals should be used and they should be applied with caution by licensed applicators only and always according to label directions.

Other Techniques and Considerations

Vegetation can be scraped off over ice using a road grader or a blade on a tractor. The material can then be piled to form loafing islands, an action which requires a Section 404 permit ([Appendix A](#)). The plants will be killed if sufficient runoff occurs to flood the emergent cattail over 18 inches for most of the subsequent growing season. This method then can create open water areas in wetlands.

Muskrats can harvest wetland vegetation. When populations are high enough, they will cut and pile large quantities of cattail, sedge and smartweed, thus creating open water areas. Unfortunately, there is no practical way to manage their populations at levels high enough to provide adequate vegetative control.

Wetland vegetation provides habitat for aquatic insects. Aquatic insects are often the most important foods used by migratory waterfowl and other migratory birds during the early spring, summer and early fall

The diversity of plant species, structure and decomposition rates in wetlands play a major role in insect abundance and diversity. Managing wetlands to promote highly abundant and diverse insect, snail, crayfish, amphibian, worm and other small life forms is important for foraging habitat. A diverse plant community maximizes invertebrates. Try to keep the energy flow through the system as rapid as possible through drawdowns and re-flooding to promote excellent water quality.

Japanese millet is an annual seed-producing grass commonly planted as a waterfowl food source. Mudflats can be broadcast seeded by hand or airplane. It is most valuable as a waterfowl food source when flooded after the seed matures. Any soil disturbance which covers seed will improve germination.

Smaller wetlands in farm fields can provide foraging habitat for migrating waterfowl and waterbirds. These farmed wetlands hold water from snowmelt and rains and are attractive foraging sites because of their openness and shallow water depths. Seeds, waste grain and aquatic insects are readily available. In some locations, it is possible to enhance these areas with small berms and control structures which allow water to be placed in the wetland in spring and then drawn down prior to the cropping season.

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C. Other Wetland Management Practices

Disease Control

Disease losses of waterfowl are a common occurrence in the RWB. Avian cholera in the RWB has been responsible for the loss of more than 200,000 ducks and geese since 1975. The disease is caused by a bacterium, *Pastuerella multocida*. Though unproven, some people believe that some birds carry the bacteria without getting sick under normal conditions. These birds begin to die when environmental stress occurs. Birds die rapidly, usually within 24 hours. Before dying, they exude considerable quantities of mucus-infected bacteria into the environment. The bacteria can survive for long periods of time, especially in turbid water conditions. Ultraviolet light kills the organism.

The best management strategy is to provide the maximum amount of water possible so that birds can spread out. When spread over a larger area, the birds are less susceptible to disease transfer and are generally in cleaner, clearer water conditions. Pumping your wetland, particularly in February and March, will help reduce disease outbreaks. The other management strategy is to pick up and burn carcasses. This human disturbance helps disperse large concentrations of birds and minimizes the amount of bacteria present in the environment.

Other common diseases of waterfowl which have occurred in Nebraska are lead poisoning, botulism and aspergillosis. Lead poisoning is caused by ingestion of lead shot. Waterfowl hunters are now required to use steel shot nationwide, but lead is still present in the environment and occasionally still causes losses.

Botulism is caused by an anaerobic bacteria, *Clostridium hotulinum*. The disease is most often associated with hot weather, drawdowns and other periods when wetlands have high decomposition rates. Wildlife which die become flyblown and maggots spread the disease. Disposing of carcasses and hazing birds off infected areas are the major control strategies. Preventing large amounts of dead plant material from accumulating in wetlands and delaying fall flooding until October help prevent disease-prone situations.

Aspergillosis is a waterfowl disease caused by ingesting a fungus found on moldy grain. It generally occurs in isolated situations and does not cause large losses.

Islands

Islands provide a loafing and resting area that waterfowl need. Waterfowl commonly loaf along shorelines, dikes, muskrat houses, ice edges and other locations, but islands can improve waterfowl use of a wetland. Because they are expensive to construct, islands are most appropriately built in conjunction with some other construction activity such as using the spoil from a dike construction project to form an irregular mound above the highest expected water level. As with all soil disturbance in wetlands, a 404 permit authorizing the construction activity may be required.

Predator Control

Predator control has been practiced in the past in an attempt to produce greater numbers of waterfowl, other upland nesting birds and big game. It is a controversial technique for a variety of scientific and political reasons. Done effectively, it can increase production. Done ineffectively, it harvests furbearers and other predators at high costs. We do not recommend using this technique because the RWB is not a major waterfowl production area. The limiting factor to waterfowl production in the RWB is a reliable source of water in the summer and lack of adjacent cover. Predator control does not solve these

problems. The limiting factor to upland game production is the small amount of quality nesting cover. We recommend that your efforts to increase production focus on limiting factors.

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Management for Migratory Waterfowl - Upland Management

Upland management practices have an impact on habitat use by waterfowl. Any upland management practice which will improve water quality and increase water quantity in wetlands is beneficial to waterfowl. Practical ways to achieve this are to establish grassed waterways in intermittent drainages and increase grassland buffers around wetlands. If changing cover types is not practical or does not apply to your site, there are still techniques and practices that you can use on your current cropland, grassland and woodland/brush cover types.

Cropland

Waste grain provides the most abundant food source for migrating waterfowl and cranes in the RWB area. Corn is the preferred food source for ducks and geese, but ducks will also use fields of sorghum and soybeans. Fields near wetlands are generally the first to be used until the waste grain is depleted, then the birds then fly farther out to feed. Avoid fall tillage, especially plowing and disking, to encourage migratory bird use of your field. Shredding, on the other hand, will make the field appear more open. Geese prefer shredded fields over unshredded fields.

Small grain fields of wheat, oats, barley and rye are attractive to migratory waterfowl. Fall planted wheat and rye fields are often the only green feed available during the fall migration and provide excellent forage for geese. Geese using fields that are very wet or have been recently planted will sometimes cause economic damage by uprooting the entire plant or crusting the surface. Under these conditions, birds may be hazed from fields using propane cannons, shell crackers and scarecrows. Generally, bird use will not significantly affect yields.

Set-aside, or other idle acres, are generally the least productive cropland acres. These acres provide nesting cover and brood-rearing cover when planted to grass or when annual plants are allowed to grow.

Grassland

There are two types of grassland found in the RWB area: tall warm-season grasses and cool-season grasses. Warm-season grass provides filter strips, upland nesting cover and winter cover. Warm-season grass benefits from rest in July and August when it sets seed and stores energy in the roots.

To provide nesting cover, leave at least one-third of the stand during the nesting season. Both warm and cool season grass stands require periodic vegetation removal by haying, grazing or fire to remain vigorous. Treating a portion of the stand every year provides a mosaic of habitat types that insures continued annual use by wildlife. It is best not to apply the same treatment at the same time every year. Vary treatments and timing to achieve the maximum plant diversity and the best wildlife use.

Cool-season grasses green up early in the spring. For this reason, they provide excellent nesting habitat for waterfowl, particularly if they have alfalfa or other legumes mixed in the stand. For best nesting production, these stands should be hayed or grazed every other year so that residual cover is present in spring months. Grazing from April 15 to April 30 is recommended in stands where you wish to reduce cool-season dominance. Including a variety of legumes such as alfalfa, sweet clover and red clover adds

diversity that produces excellent nesting and brood-rearing cover.

Woodland/Brush

This habitat type provides generally little or no benefit to migratory waterfowl use. A few tall trees near the wetland can serve as eagle roosting areas when waterfowl are present. Shelterbelts that are planted on the north and west sides of wetlands can increase snow accumulation that supplements spring water levels. Wood ducks nest in cavities in older trees. To optimize waterfowl use, this habitat type should not be encouraged adjacent to wetland areas.

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Management for Endangered Species

Federally listed threatened and endangered species which may use RWB wetlands and associated uplands are the whooping crane, bald eagle, peregrine falcon, interior least tern, piping plover, western prairie fringed orchid and American burying beetle. We recommend that you learn to recognize these species and to inform the U.S. Fish and Wildlife Service or the Nebraska Game and Parks Commission if you encounter a listed species.

The whooping crane uses RWB wetlands often enough that we suggest some management actions to enhance its required habitat. They are most likely to occur on wetlands located west of a north-south line through Aurora, Clay Center and Superior, Nebraska. The spring migration occurs between April 1 and May 15 and the fall migration occurs between October 1 and November 15. Whooping cranes use shallow, sparsely vegetated streams and wetlands with good horizontal visibility and a low level of disturbance as roosting and feeding sites during migrations. Wetland vegetation should be less than three feet high and water where roosting may occur should be less than 12 inches deep. Whooping cranes prefer wetlands that are more than 500 yards from a road, although they have been known to tolerate moving vehicles at shorter distances. Recommended observation distances are at least a quarter mile to prevent disturbance. A good example of a basin that is attractive to whooping cranes is the Gleason Waterfowl Production Area located southwest of Minden, Nebraska.

Collisions with power lines have killed whooping cranes in Nebraska and Colorado. Marking power lines with yellow aviation markers is recommended for lines near wetlands used by whooping cranes.

Whooping cranes are susceptible to avian cholera and have been hazed from wetlands with disease outbreaks in progress.

Bald eagles are attracted to concentrations of waterfowl which occur in the basins, primarily in November, February and March. Eagles use large cottonwood or other trees scattered around the wetland edges as hunting and loafing perches.

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Management for wading and Shorebirds Wading birds include herons, egrets, ibises, pelicans, rails and similar species. Some of these species are colonial nesters that nest in dense stands of cattail or bullrush. This habitat is available in the basins during wet years. Once a colony is established, it should be undisturbed during the nesting and brood-rearing periods. Non-nesting birds will spend the summers using marshes for foraging and other life functions, concentrating their activities in shallow water habitats. Summer water insures that these species will be present.

Shorebirds are most abundant in spring migration, but are also present during fall migration in August and September. Their habitat requirements are open areas with little or no plant cover and water depths of six inches or less. Natural drawdowns in April and May provide this habitat. Drawdown areas which have some water permanence may attract nesting killdeers, avocets, sandpipers and other species. Upland sandpipers require very little water, but are usually associated with stands of perennial grasses adjacent to marshes. Encouraging fall migration use generally requires discing, mowing, severe grazing or burning which reduces vegetation height, followed by flooding of these areas. Water should be available from mid-August to October for best results.

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Management for Non-game Migratory Species

Optimum management for waterfowl and resident species will also generally provide habitat suitable for these species. Food, nesting habitat and winter cover are primary needs. Maintaining native prairie and riparian habitats are probably the most important needs. At least some rested prairie should be available during the nesting season from May to July 15. The same requirement is needed for those resident and short distance migrants during winter periods.

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Management for Resident Wildlife

Several factors that are important to all wildlife should be considered when managing for resident wildlife. All wildlife require food, shelter and water to meet their needs and areas that have the greatest variety of plants and cover will support the highest numbers of wildlife. Food and water are generally not considered a limiting factor for resident wildlife in the RWB area. Cover is the most limiting factor when planning for resident wildlife and should receive the greatest emphasis.

Secure nesting cover is the limiting factor for ring-necked pheasants in the RWB area. Providing dense nesting cover that is safe from mowing and other disturbances from April 15 to July 15 is required for successful nesting. The best nesting cover provides good height and overhead cover. Warm-season grasses such as switchgrass, big bluestem and Indian grass will provide ample cover for nesting, roosting and loafing cover. Nesting cover may also be provided by delaying the mowing of roadsides until after July 15 each year. Winter cover is also an important requirement. Multi-row shelterbelts and cattails provide the best cover for pheasants during the blizzards and ice storms common to Nebraska winters. Pheasants need a wintering area adjacent to a winter food source.

Northern bobwhite quail nesting requirements are slightly different than that of pheasants, but just as important. Good nesting cover is a mixture of grasses and shrubs in an area with about 50 percent of the ground exposed. Brushy areas are important to quail populations throughout their life. Winter cover for quail is similar to that of pheasants, with plum patches and brushy areas being preferred. Winter cover can also be provided by any low brush, young evergreens and annual weeds.

Rabbits easily adapt to a wide variety of habitat types. They prefer trees and shrubs, which are used as escape cover, food and shelter. Winter cover may be provided by brush piles that are placed 50 to 100 yards apart and are five to 10 feet tall. Brush piles should be added to and built up each year.

White-tailed and mule deer home ranges are much larger than other resident wildlife, making it more difficult for a single landowner to influence deer populations. Deer will use large areas of dense grass as

bedding areas. Multi-row shelterbelts also supply bedding areas, escape and loafing cover.

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Public Use Management

Managing wetlands and adjacent upland habitat and wildlife is only the first step for the public land manager. Plans addressing human needs must also be prepared and implemented to optimize both human and wildlife use. Public use plans should address access to the area, identify compatible and incompatible uses, outline timing and seasons of use, determine educational opportunities and provide the user with information regarding both opportunities and requirements for using the area.

We strongly encourage involving the public in the development of plans and management of an area. Involving the public requires keeping them informed of significant developments through meetings, presentations and press releases. Inviting service clubs, individuals or other local agencies to participate in development projects or specific management tasks can provide a sense of ownership of the project. Participation will provide significant long-term benefits to this and other public programs. Encourage compatible uses by informing teachers, the Future Farmers of America, 4-H clubs, conservation organizations and other groups about educational opportunities, recreational programs, tours and significant activities on the area.

There are some minimal features needed in order for the public to enjoy the area and use it responsibly. The first is providing information to help the public find the area. This can include highway signs for large significant areas or at least maps/leaflets placed at local sporting good stores, chambers of commerce, tourist bureaus and other appropriate locations.

A visitor contact station should be available at large areas to explain opportunities such as nature trails, observation platforms, photo/hunting blinds and handicapped facilities. Information about wildlife viewing opportunities, hunting opportunities and seasons and regulations concerning these uses should also be readily available. Leaflets should give a good description of the importance of the areas, compatible uses and regulations affecting users.

Parking areas should be available at all locations so that local roads remain open.

Other activities such as woodcutting, grazing, haying or other consumptive uses should be open to all members of the public according to agency policy. These activities are valuable because they provide habitat management on the area. Close working relationships are necessary to achieve desired results. Surrounding landowners and prior owners of the area are usually the major cooperators in these programs.

Despite the best public education and information effort, there will be times when problems with public use occurs. We are fortunate that problems in the RWB are relatively minor when compared to much of the country. The major problem has been with hunters shooting too close to adjacent farmsteads. According to state law, no hunting is allowed within 200 yards of a farmstead except with permission. This can be managed by mowing and posting a no hunting zone around adjacent farmsteads.

Other problems are increased vehicle traffic around wildlife areas during spring and fall months and vehicle and foot trespass on surrounding private land. Insuring that parking lots, pullouts, and other areas are accessible and mowed usually solves traffic concerns. Surrounding landowners should be informed they may have to increase posting efforts. At times it is necessary to actively patrol and enforce area

regulations by catching violators and citing them. Usually this is the only way to stop serious repeated hunting or trespass violations from occurring.

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APPENDIX A. List of Offices Which Can Provide Technical or Financial Assistance

USFWS Private Lands Coordinator 308-382-6468
USFWS Region 6 Migratory Bird Coordinator 308-236-8676
NGPC Private Lands Administrator 402-471-5413
Pheasants Forever, Inc. 308-384-8355
Pheasants Forever Regional Representative 308-384-8355
Ducks Unlimited Regional Biological Supervisor 701-258-5599
Central Platte NRD 308-385-6282
SCS County Offices See phone book
Little Blue NRD 402-364-2145
Lower Big Blue NRD 402-228-3402
Lower Republican NRD 308-928-2182
Tri-Basin NRD 308-996-6688
Upper Big Blue NRD 402-362-6601

Office to Contact For Financial Assistance

ASCS County Offices See phone book
USFWS Private Lands Coordinator 308-382-6468
NGPC Private Lands Administrator 402-471-5413
SCS County Offices See phone book
Pheasants Forever Regional Representative 308-384-8355

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APPENDIX B

Appendix B provides a listing of the most common federal, state and local regulations that may pertain to wetland management activities. These regulations are subject to change, so please contact the appropriate agency for current information.

1. Section 404 of the Federal Clean Air Act -- Administered by the U.S. Army Corps of Engineers. This law regulates any activity that results in fill being placed in waters of the United States, including wetlands and seasonal water courses. A general permit has been developed that simplifies compliance with this and the following regulation when conducting wetland restoration or enhancement activities with assistance from the U.S. Fish and Wildlife Service or the Nebraska Game and Parks Commission.
2. Water Quality Certification under Section 401 of the Federal Clean Water Act -- This is a companion law to Section 404, but is administered by the Nebraska Department of Environmental Quality.
3. The 1985 and the 1990 Federal Farm Bill Wetland Conservation Provisions -- Commonly known as "Swampbuster," this law applies to any wetland conversion activity that makes increased agricultural production possible. It is administered by two U.S. Department of Agriculture agencies, the Agricultural Stabilization and Conservation Service (ASCS) and the Soil Conservation Service (SCS).
4. Flood Plain Ordinance -- This law applies to construction activities that are conducted in certain flood

plain areas. It is administered by the Nebraska Department of Water Resources.

5. Surface Water Storage, Diversion and Use -- This law applies to construction activities for the purpose of storing, diverting or using surface water. It is administered by the Nebraska Department of Water Resources.

6. Ground Water Management and Protection Act -- Administered by the local Natural Resources Districts, this law applies to the pumping and use of ground water. A permit may be required in certain districts.

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