Dear Waterfowl Enthusiast,

You want to see more ducks. We do, too.

And we intend to make that happen by more aggressively and intensively managing many of our state Wildlife Management Areas (WMAs) with a technique called moist soil management.

Moist soil management is a way to provide food and water for ducks by creating and managing seasonal wetlands that are only a few inches deep. These intensively managed fields of food and water, which mimic naturally-occurring wetlands that form in spring and fall, can be magnets for migrating waterfowl.

Moist soil management is not the overall solution to Minnesota's duck dilemma. Still, this technique will benefit waterfowl hunters. Ducks and geese have flocked to our existing moist soil units at our Lac Qui Parle, Roseau River, Thief Lake and Teal Lake WMAs, plus the shallow waters of the North Ottawa flood control project in the Red River Valley.

Until now, Minnesota has not had guidelines for making and managing moist soil units. Now that we do, it will be easier for DNR staff and conservation partners to put this practice on the ground. As this happens, it will complement our more aggressive and intensive management of state-owned shallow basins. Together, our new moist soil guidelines and shallow lakes plan should improve duck numbers and duck hunting.

Thanks for your interest in moist soil management. Best wishes during your days afield.

Sincerely,

Dave Schad, Director

Division of Fish and Wildlife

Minnesota Department of Natural Resources

Ray Norrgard November 30, 2010

MINNESOTA MOIST SOIL MANAGEMENT GUIDE

PREFACE

Waterfowl are an important part of Minnesota's natural and cultural heritage. Despite substantial losses in the quantity and quality of waterfowl habitat, Minnesota remains one of the most important production and harvest states in the Mississippi Flyway. Waterfowling traditions reach back to the 19th Century and continue to be an important feature of Minnesota's outdoor heritage. Trip and equipment expenditures by Minnesota waterfowl hunters and watchers in 2001 totaled more than $224 million and generated more than $20 million in state tax receipts.

While the Minnesota Department of Natural Resources (DNR) and our conservation partners have continued to make progress in acquiring and developing wildlife areas, managing shallow lakes, and acquiring permanent easements, recent declines in breeding duck populations and reduced hunter participation and harvest have frustrated both hunters and managers. Based on the most recent available data it is clear that the basic issues of habitat degradation and loss are still major barriers to success.

A key wetland type in this habitat picture is seasonal wetlands. Critical for attracting and providing food for breeding ducks, seasonal wetlands flooded in fall also provide attractive habitat for migrating dabbling ducks. In addition, seasonal wetlands in the upper reaches of watersheds are among the most effective landscape features to reduce flooding and improve water quality.

A technique called moist soil management creates seasonal wetland habitat through intensive water level management. Much of the science and information behind moist-soil management was developed by waterfowl managers and research biologists in Missouri. On January 9, 2010, DNR Commissioner Mark Holsten committed the Minnesota DNR to expanding the application of moist soil management in Minnesota.

The primary purpose of this guide is to introduce wetland managers, conservation partners, policy developers, and funding decision makers to the concepts of moist soil management and provide guidance on the location, development, and management of opportunities for moist soil management in Minnesota. This guide is a work in progress. As managers and other moist soil management practitioners gain experience in Minnesota, they are encouraged to share their successes and failures in an effort to constantly update and improve this document.

CONTENTS

EXECUTIVE SUMMARY

The greatest wetland losses in Minnesota occur in seasonal and temporary wetlands. Their small size and shallow depth made them an easy target for conversion to agriculture as early as the mid 19th Century. Losses in both quantity and quality have continued in Minnesota to the detriment of waterfowl, shorebirds, and other wetland wildlife that depend on these wetlands for survival.

Protection through acquisition and restoration has been the primary strategy to increase seasonal wetland habitat. Moist soil management is another tool to help address the losses in quantity and quality of seasonal wetlands. Areas managed with moist soil management techniques are typically created, restored, or enhanced wetlands that are intensively managed as shallow water seasonally flooded basins 1-12 inches deep. This management is intended to provide high energy food resources such as annual plant seeds and invertebrates and optimal feeding conditions for dabbling ducks and shorebirds when flooded during spring and fall. Reducing disturbance through sanctuaries will increase duck and shorebird use of these wetlands.

Moist soil management is not totally new to Minnesota. Minnesota currently has a small amount of moist soil management incorporated into the overall management of a few major wildlife management areas (less than 300 acres in total). In addition, the nearly completed North Ottawa Project in Grant County has opened the door to the potential of combining moist soil management with flood reduction efforts.

Our shorter growing season, earlier freeze-up date, and greater mix of duck species in our fall harvest present challenges to optimizing the benefits of moist soil management in Minnesota. However, the habitat complexes provided by our large number of wildlife management areas, waterfowl production areas, and shallow lakes can provide a synergy with moist soil management that will benefit both duck production and hunting opportunities. In addition, the concepts of moist soil management can be used to help enhance the quality of more permanent wetlands including shallow lakes and Mississippi River pools.

If adequate resources are available the Minnesota Department of Natural Resources intends to work with our conservation partners to add 10,000 acres of publicly owned wetlands managed as seasonal wetlands using moist soil management techniques by 2025. In addition, we will apply moist soil management to 20,000 acres of wetlands within our current wildlife management area system and encourage the development of 5,000 acres of moist soil management sites on private land through permanent easements and technical assistance.

Establishment criteria will include ownership, location, topography, soils, water source, applicable regulations, and cost.

INTRODUCTION

The greatest wetland losses in Minnesota occur in seasonal and temporary wetlands. Their small size and shallow depth made them an easy target for conversion to agriculture as early as the mid 19th Century. Losses in both quantity and quality have continued in Minnesota to the detriment of waterfowl, shorebirds, and other wetland wildlife that depend on these wetlands for survival.

In the spring seasonal wetlands are critically important for attracting and supporting breeding wetland birds, including ducks, by providing abundant food. Although typically without surface water during the summer, they can provide abundant food resources again in the fall if flooded by autumn rains. Protection through acquisition and restoration has been the primary strategy to increase seasonal wetland habitat.

Moist soil management is another tool to help address the losses in quantity and quality of seasonal wetlands. Areas managed with moist soil management techniques are typically created, restored or enhanced wetlands that are intensively managed as shallow water seasonally flooded basins 1-12 inches deep. This management is intended to provide high energy food resources and optimal feeding conditions for dabbling ducks and shorebirds when flooded during spring and fall. The annual plants typically growing during the summer dry period can also provide excellent brood habitat for pheasants and attractive food for doves and songbirds.

Moist soil management has been used effectively in many mid-latitude states such as Missouri to increase duck use during spring and fall migration, as well as provide hunting opportunities during the fall. Potential benefits in Minnesota are somewhat different than those seen in these mid-latitude states due to our shorter growing season, earlier freeze-up date, and greater mix of duck species in our fall harvest.

However, the habitat provided by our large number of wildlife management areas, waterfowl production areas, and shallow lakes can provide a synergy with moist soil management that will benefit both duck production and hunting opportunities. In addition, the concepts of moist soil management can be used to help enhance the quality of more permanent wetlands including shallow lakes and the pools on the Mississippi River between locks and dams. Planning for future moist soil management should include these opportunities.

Moist soil management is not totally new to Minnesota. One of the key strategies in the 2001 plan *Restoring Minnesota's Wetland and Waterfowl Hunting Heritage* was the development of moist soil management sites to improve fall migration habitat. The DNR, U.S. Fish and Wildlife Service and Minnesota Waterfowl Association co-sponsored a professional seminar in 2003 to introduce Minnesota conservation professionals to moist soil management techniques.

The need for improved fall migration habitat was echoed in the *2006 Duck Recovery Plan* as concern mounted about fall duck use and hunter satisfaction. The 2006 plan also highlighted the important role of seasonal wetlands in waterfowl production. The plan called for an additional 600,000 acres of wetlands configured in wetland habitat complexes of at least 4 square miles. Each complex would be targeted for a minimum of 20% wetlands and 40% grassland. One-half of these additional wetland acres were recommended to be temporary and seasonal wetlands.

Minnesota currently has a small amount of moist soil management incorporated into the overall management of a few major wildlife management areas (less than 300 acres in total). In addition, the nearly completed North Ottawa Project in Grant County has opened the door to the potential of combining moist soil management with flood reduction efforts. Although we still have much to learn these areas have provided valuable insights into the possibilities and the potential limitations of this management in Minnesota.

MOIST SOIL TARGETS

Our preliminary moist soil management targets are based on the experiences of both the Missouri Department of Conservation and the Minnesota Department of Natural Resources, as well as wetland habitat objectives from the 2006 Duck Recovery Plan. If adequate resources are available the Minnesota Department of Natural Resources intends to work with our conservation partners to add 10,000 acres of publicly owned wetlands managed as seasonal wetlands using moist soil management techniques by 2025. In addition, we will apply moist soil management to 20,000 acres of wetlands within our current wildlife management area system and encourage the development of 5,000 acres of moist soil management sites on private land through permanent easements and technical assistance. These targets should be revisited as our collective experience continues and new information becomes available.

BACKGROUND

WHAT IS MOIST SOIL MANAGEMENT?

Moist-soil management simulates seasonal wetland hydrology by adding and removing water, most often artificially, in a systematic way to maximize food production for waterfowl and shorebirds. An area managed for "moist soil" is gradually dewatered (drawn down) after spring, slowly dried during the summer to encourage seed-producing annual wetland plants, and re-flooded in late summer or early fall. These annual seed producing plants can also provide valuable summer brood habitat for pheasants and attractive food sources for doves and songbirds.

When flooded in early fall, the seeds are readily available for migrating birds. Decomposing plants provide ideal habitat for aquatic invertebrates, especially in the spring when waterfowl and shorebirds require this important source of nutrition. Ideally, basins can be dried enough during some growing seasons to periodically till all or portions of the site. Soil disturbance helps to maintain productivity of annual plants, controls undesirable perennial vegetation including invasive species, and can be used in conjunction with cropping in lieu of natural seed production.

Factor	Ideal Condition
Soil	Hydric
Topography	Flat to very gently rolling. Individual pools or basins should have less than 1 foot of fall. Uneven bottoms provide an ideal mix of depths for plant production and foraging.
Plant Succession	Early succession native annual plants adapted to seasonal flooding. Examples include smartweeds, wild millets and beggartick. A mix of species is ideal. Planted crops include millet and corn.
Water Levels	Depths ranging from saturated soil to 12 inches deep. Flooding and dewatering should occur very gradually, approximately 1" a day. Dewatering should begin during the first third of **the** growing season.
Adaptive Management	Use annual assessments of vegetative response and bird use to adjust water level management and soil disturbance.

TABLE A. CRITICAL FACTORS FOR SUCCESSFUL MOIST SOIL MANAGEMENT.

The success of moist-soil management is dependent on soil type, topography, maintaining early successional annual plants, the timing of water level manipulations, and annual monitoring to assess management effectiveness (Table A. Critical factors for successful moist soil management). Although naturally occurring precipitation and seasonal flooding can produce results, more intensive management is often required in altered landscapes. In these instances, the most consistent success is achieved when water levels can be precisely controlled to encourage moist-soil plants and subsequently provide the depths most attractive to feeding waterfowl and shorebirds. The response of moist soil sites to water management change over time. Annual monitoring and adjustments (adaptive management) are critical to success.

HOW IS MOIST SOIL MANAGEMENT TYPICALLY CONDUCTED?

Traditional moist soil management sites in mid-latitude states are typically located in the broad floodplains of major rivers. Large pumps and extensive dikes or levees are integral parts of the design. Dikes follow the topographic contours to maximize the amount of shallow water. Open ditches adjacent to dikes are avoided when at all possible due to maintenance issues caused by muskrats and beaver. Publicly owned areas are often quite large, many in the thousands of acres.

Unless there is a special management need such as cropping, moist soil management sites are flooded in the spring or retain water from the previous fall. Water is held until late spring, generally May through early June. This helps prevent some undesirable plants that need dry conditions to germinate. For northern states like Minnesota, drawdowns (dewatering) during the first third of the growing season tend to favor smartweeds. Drawdowns mid to late in the growing season benefit beggartick, panic grasses and crabgrass. Drawdowns in between these times often produce wild millets. The seeds of all of these plants are valuable to waterfowl and none of them typically require planting.

Water levels should be lowered at a slow rate, gradually exposing bottom soils over a few weeks. This general rule, however, depends on soil type, temperature, precipitation patterns, and management capabilities. Slow drawdowns prevent soils from drying too quickly and produce a greater variety of desirable plants over the site. More rapid drawdowns (over a few days) tend to produce extensive stands of similar vegetation. Rapid drawdowns are particularly troublesome in mid-summer. The soil tends to dry too quickly, resulting in cocklebur, cottonwood seedlings and other undesirable species. Care should be taken to avoid a regimented “cookbook recipe” for moist-soil management. Each basin is unique and the wetland managers’ experience and evaluation of vegetative response are important.

Water levels need to be drawn down earlier in the spring, and the sites maintained drier, if crops such as corn are planted. Small grains with a shorter growing season are not as demanding although soils need to be dry enough for tillage. Installing a controlled drainage system with pattern tiling could provide additional flexibility for drawdowns since soil moisture can be more precisely controlled. However, the additional investment must be balanced with the expected benefits. The more elaborate the infrastructure the greater the long-term cost for development, operation, and maintenance.

Long dry periods during summer favor undesirable plant species. Shallow flooding (irrigation) will stimulate desirable moist-soil plants and can set back or even kill undesirable species. Moist-soil plants are not adversely affected by summer flooding as long as one-third of the growing plant is out of the water. Summer flooding is not beneficial when crops such as corn are planted.

Plant species composition will also be affected by the general state of annual plant succession. Perennial plants like rice cutgrass, reed canary grass, cattail, and willow tend to increase after three or more years without tillage or other soil disturbance. Many of the prolific seed producing plants like wild millet and large seeded smartweed occur in the first few years of management or following soil disturbance.

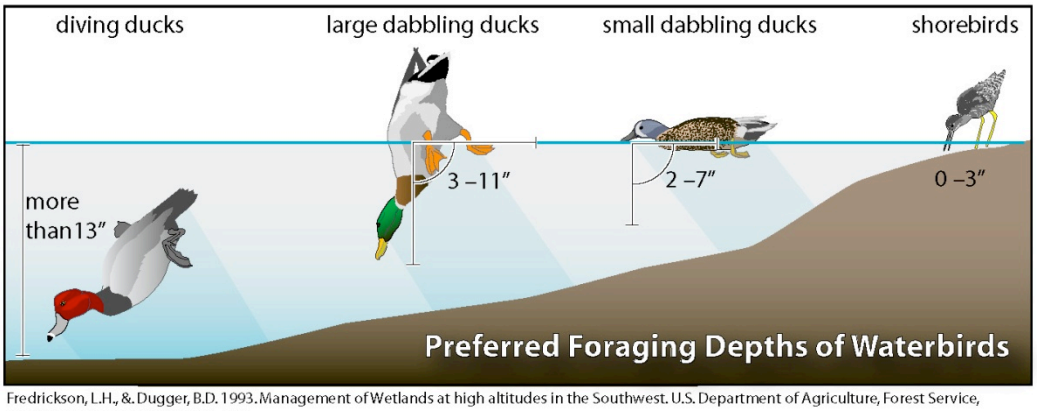
Often the most effective approach is to annually rotate the disturbance treatment over individual cells in the management site so that the entire site receives treatment over three to five years. It may be possible to target the production of crops such as corn during years when disturbance is desired.

Invading woody plants and many other undesirable species can also be temporarily controlled by mowing. Mowing is especially effective when desirable moist-soil plants occur under rank cocklebur. The mowing will remove shade and competition, and moist-soil plants will begin growing rapidly, especially if irrigated.

Mowing can also be used to improve desirable moist-soil stands when the plants become too dense or reach heights that will reduce their availability to many wildlife species. Midsummer mowing to a height of 18 inches will make these areas more attractive, but mowing should be timed to ensure maximum seed production. Contrary to mowing or manipulating cultivated crops, the mowing of native plants, even those that have already produced viable seed, is not considered baiting for waterfowl (see Appendix B. Baiting Regulations for Waterfowl Hunting).

Moist soil management sites in northern states are flooded from late August to late September depending on management objectives. Row crops such as corn should not be flooded until after maturation of the crop. A slow, continuous flooding of the unit will provide optimum feeding conditions for many wetland species by gradually flooding new margins of the basin. Flooding depths are critical to success.

Many species of wildlife, including most dabbling ducks, prefer water depths of less than six inches and as little as two to three inches (Figure 1. Preferred foraging depths of water birds). Any depths over 12 inches are undesirable unless there is a special management need such as targeting diving duck use. Generally, providing diving duck habitat is more appropriate with management of semipermanent and permanent wetlands and shallow lakes.



Fredrickson, L.H., &. Dugger, B.D. 1993. Management of Wetlands at high altitudes in the Southwest. U.S. Department of Agriculture, Forest Service, Southwest Region, Washington, D.C.

FIGURE 1. PREFERRED FORAGING DEPTHS OF WATERBIRDS.

MOIST SOIL MANAGEMENT IN MINNESOTA

Most mid-latitude moist soil management opportunities are focused on the floodplains of large rivers like the Missouri and Mississippi. With nearly 20% of Minnesota covered with surface water our state has a much broader distribution of wetland habitat. It clear, however, that Minnesota's remaining wetland habitat lacks adequate food resources for waterfowl, shorebirds and other wetland wildlife. The shallow wetland habitat provided by seasonal wetlands and the margins of permanent wetlands has been largely lost to conversion to other land uses or taken over by invasive species such as hybrid cattail that provide few food resources. A December, 2009 report to the U. S. Environmental Protection Agency suggests that more than half of our remaining prairie wetlands are of poor quality as measured by plant and invertebrate indices.

Our remaining wetland and shallow lake resources, however, do provide potentially greater geographic flexibility in conducting moist soil management and greater opportunities within existing wetland habitat complexes to maximize benefits. While the potential sites identified for most soil management in Minnesota will typically be much smaller in size than those in the broad floodplains of the large rivers further south, we do have opportunities for larger projects in the Red River Valley and to a lesser extent along the Minnesota River.

The concepts of moist soil management have a potentially wide range of applications in Minnesota. On one end of the scale are relatively low cost projects enhancing existing small wetland basins or restoring drained wetlands with the ability to flood or dewater depending on the situation. At the other end of the scale are large wetland restorations or impoundments complete with extensive dike and pumping systems. In between are natural semi-permanent or permanent wetlands subjected to intensive water level management to reduce undesirable fish and encourage annual plant and invertebrate production.

The basic concepts of moist soil management can also be applied to shallow lakes and Mississippi River pools when drawdowns are being conducted to improve aquatic habitat. Although these are not moist soil management sites per say, there may be opportunities to achieve some of the same benefits when the management objectives and moist soil concepts are compatible.

All of these systems have the same basic objective of providing rich food sources through the production of invertebrates and aquatic plants. Moist soil management focuses on a summer drawdown period to promote the growth of desirable annual plants and shallow water flooding in fall and spring to increase the availability of seeds and invertebrates to dabbling ducks and shorebirds. In some cases proper management of water levels to promote aquatic food sources will negatively impact traditional hunter access. For example, water depths suitable for motorized watercraft are not compatible with maximizing waterfowl food availability through moist soil management techniques.

Another key element in moist soil management is periodic disturbance to set back plant succession to favor annual rather than perennial plants. This may be particularly important when faced with infestations by invasive species such as hybrid cattail, reed canary grass, and the invasive form of phragmites.

The moist soil areas that are the most attractive to waterfowl are located within or near wetland habitat complexes associated with some type of sanctuary from disturbance (Figure 2. Existing refuge areas in Minnesota). Reduced disturbance can be accomplished through a range of restrictions including no motorized use, no hunting, or no trespassing (Appendix C. Rest Area Options). The most effective at reducing disturbance are no trespassing regulations through designated sanctuary on areas approaching 600 acres in size. Smaller sanctuaries can be effective if there are other barriers such as water, topography or land use that reduce distance to disturbance. Sensitivity to disturbance is greatest during open hunting seasons, especially by migrating birds that have not established local feeding patterns.

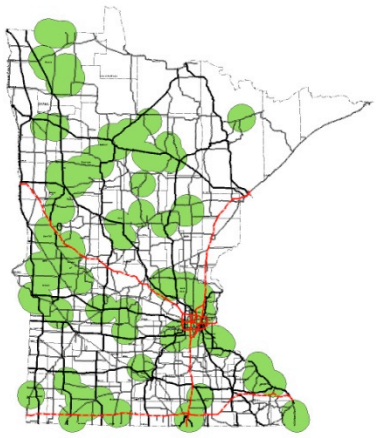


FIGURE 2. EXISTING REFUGES WITH CALCULATED ZONES OF INFLUENCE.

Large moist soil management projects (1000+ acres) can provide both sanctuary and hunting opportunities. Opportunities to provide sanctuary are not absolutely necessary for viable application of moist soil management techniques; however, the attractiveness of these areas to migrating waterfowl is much greater when they are protected from disturbance.

Smaller moist soil projects can contribute significantly to attracting and holding migratory waterfowl when they are part of a larger habitat complex. Adjacent or nearby managed public or private wildlife areas and shallow lakes provide supporting habitat and the opportunity to establish effective sanctuary areas as well as hunting opportunities. While waterfowl hunter surveys have documented that creating refuges is one of the most popular management strategies, experience shows that establishing new refuges or sanctuaries is much easier where there is no established public hunting tradition. For example, designation of newly acquired lands as sanctuary face far less resistance than areas previously open to public hunting.

Moist soil management is very compatible with desires to reduce downstream flooding and improve water quality. Flood reduction benefits are particularly noteworthy if management sites are allowed to dewater in late fall and early winter to maximize retention of spring runoff. However, water levels should not mimic deeper more permanent wetlands in late summer or fall because of the attractiveness to turtles seeking overwintering areas. Turtles subjected to dropping water levels during hibernation can experience high mortality. Both flood reduction and water quality benefit when early summer dewatering can be accomplished with evaporation rather than creating runoff.

SITING CRITERIA FOR MOIST SOIL MANAGEMENT IN MINNESOTA

There are clearly opportunities to expand the application of moist soil management in Minnesota. These opportunities include upgrading current moist soil management sites on major wildlife management areas (WMAs), developing additional management sites on major WMAs, taking advantage of potential opportunities on smaller WMAs, acquiring new WMAs for the purpose of developing moist soil management, acquiring or developing management agreements with existing wild rice paddy operations, working with watershed management organizations to combine moist soil management with flood control and water quality benefits, working with municipalities and others to transform decommissioned water treatment lagoons into moist soil sites, and working with landowners to develop moist soil management on private land.

Existing ownership, location, topography, soils, water source, applicable regulations, and cost should all play a role in prioritizing development opportunities. Careful thought should be given to how each of these criteria apply to potential projects.

OWNERSHIP

Existing and planned ownership are important determinants of project cost and benefits. Sites currently in federal, state, or local public ownership present the fewest legal obstacles to management and help insure a long-term return on investments. Areas planned for fee acquisition must undergo the acquisition process before management can proceed; however, these sites presumably offer better opportunities for dramatic management changes, including sanctuary status, since they begin with a "clean slate".

Lands under other public ownership such as watershed districts and water management organizations may provide opportunities as well. The seasonal flooding provided through moist soil management can benefit other water management objectives such as flood water reduction and improving water quality.

Private lands may also offer opportunities through easements, cost sharing, or management agreements. These efforts will most often involve the U.S. Natural Resource Conservation Service, Minnesota Board of Water and Soil Resources, and local Soil and Water Conservation Districts. Opportunities include wetland restoration and management, share cropping, managed sanctuaries, or some combination of these. Established management guidelines for sites under Board of Water and Soil Resources agreements do provide opportunities for moist soil management although a specific site management plan would need to be developed (Appendix E). Other regulations and agreements need to be reviewed to identify additional opportunities and barriers to moist soil management on private land.

LOCATION

Location will determine the potential overall project benefits to wildlife. Growing seasons become shorter and freeze up dates earlier as project locations move north (Figure 3. Typical freeze up dates in

Minnesota). On a landscape level, sites within the Prairie Parklands Province are important because of the greater loss of temporary and seasonal wetlands in that portion of the state and the proximity to traditional migration routes (Figure 4. ECS Province of Minnesota). Project sites within portions of the Tallgrass Aspen Parkland and Eastern Broadleaf Forest Provinces are more likely to occur within existing habitat complexes that attract waterfowl given that less habitat loss has occurred. Project sites in the Laurentian Mixed Forest may fit well in relation to waterfowl use of wild rice lakes or commercial wild rice paddies.

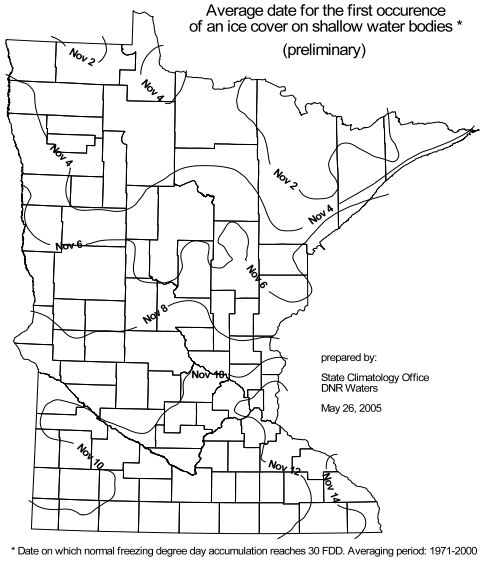


FIGURE 3. TYPICAL FREEZE UP DATES IN MINNESOTA

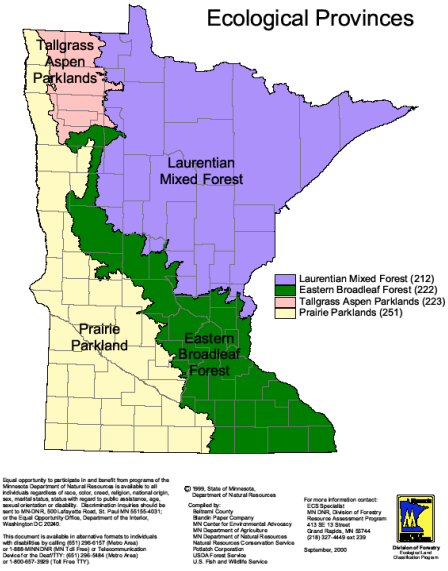


FIGURE 4. ECS PROVINCES OF MINNESOTA

In any case, sites located within or near existing habitat complexes and shallow lakes are more likely to provide benefits to the hunting public as well as benefits to migrating and breeding birds. Habitat complexes in the prairie and transitional forest zones are defined as a minimum of 4 mi^2 with 20% wetlands and 40% grasslands by area. Complexes falling short of these minimums typically contribute little to waterfowl production objectives and in some cases serve as population sinks.

In addition, distance to local staff centers can be critical for management. Travel times of more than 60 minutes roundtrip are problematic for intensively managed projects that require daily attention during flooding or dewatering. Smaller projects relying on more passive management such as evaporation require less attention. However, overall this is a significant concern given current staffing levels and moves towards office consolidation.

TOPOGRAPHY

Site topography plays a critical role in developing moist soil management opportunities. The best sites have less than a foot of fall across the area to be flooded. When evaluating these sites it is best to

visualize needed dike construction along topographical contours rather than straight line boundaries. Although following contours may increase the length of potential dikes, it maximizes the effective pool and in the long run may provide the best cost benefit.

Statewide LiDAR mapping technology will soon be available on-line. The one foot contours that LiDAR provides will be a tremendous asset for initial scoping of sites. However, on-site surveys are still a necessity for evaluation of potential sites given the very shallow nature of desired pools.

The majority of Minnesota's existing federal and state wildlife areas have been established in areas of rolling to hilly terrain. Although opportunities to apply moist soil management techniques exist on these units the sites may be limited in size. On the other hand, these smaller projects typically require minimal infrastructure to become operational. The benefits of many smaller projects are cumulative and can be particularly valuable when they occur within existing wetland habitat complexes.

There are many areas along the Minnesota River, smaller prairie rivers, and the Red River Valley that have topography suitable for larger moist soil management project sites. In addition, previously drained shallow lake basins typically have very flat former lake bottoms. These areas provide the greatest opportunity to combine wildlife objectives with flood reduction and water quality benefits.

SOILS

The most appropriate soils for moist soil management are hydric soils or soils that have low permeability or a restrictive under-lying layer. Soils with silt, clay, or loam will hold water and are well suited for impoundment construction, while soils composed of coarse sand or gravel are too porous to retain water and poorly suited for impoundments. These soil textures can erode or allow water seepage that may result in levee deterioration, high turbidity levels, and increased costs for maintaining water levels. Sites that have soils that are hydric due only to high water tables may not be appropriate if the soils are porous and well drained. Soil surveys are critical to evaluating a site for potential moist soil management. Fortunately, Minnesota has all of its county soil maps available on-line. These maps are great resources for initial soil determinations. On-site sampling is a prerequisite for sound project planning.

WATER SOURCE

A dependable source of surface water to allow for spring and fall flooding is required to meet the intensive management demands of moist soil management. For example, the 110 acre Killen Moist Soil Unit at the Lac qui Parle Wildlife Management Area requires approximately 120 million gallons of water to reach full pool. Calculations for needed water supplies should be done in consultation with a hydrologist while taking into account soil type and expected losses to evaporation and transpiration.

Gravity fed systems are clearly the most desirable from a cost standpoint, however, the opportunities for such systems are limited. Perched wetlands and shallow lakes are obvious potential sources of water. Again, calculations of potential water volumes from these types of sources need to take into account the effects of summer evaporation and soil wetting loss. It will not be uncommon for sites to require the use of pumps to achieve fall flooding objectives.

The use of portable pumps rather than permanent installations may be entirely appropriate, particularly when managing a number of smaller sites within reasonable travel distance. Diesel powered pumps with attached intake and discharge units are obviously the most portable although the possibility of portable pumps that can be connected to permanently installed infrastructure should also be considered. The cost benefit in terms of installation, longevity, operation, and results of these alternatives need to be carefully weighed in project design. The lowest initial cost, for example, may be outweighed by the long-term operating costs in fleet and staff.

Many identified opportunities will be on sites with active drainage systems. While moist soil management may benefit rather than detract from a functioning drainage system it will be important to work with adjacent landowners and the legal ditch authority, if applicable, to insure there are no legal or political impediments to future management. The use of ground water for flooding moist soil sites will not be permitted by the Department of Natural Resources.

APPLICABLE REGULATIONS

A number of regulations may apply to developing and managing moist soil projects. Developing moist soil management opportunities typically involves the removal and placement of fill for construction of dikes and water control structures, the grading or discing of bottom soils, appropriating water for flooding, and the discharge of water during drawdowns. Any one or all of these activities may require a local, state, or federal permit depending on the circumstances involved (Appendix E. Regulations affecting moist soil management). One of the most important drivers for development permits will be whether or not the management site is considered to be a jurisdictional wetland under local, state or federal law.

It is not expected that there will be significant water quality concerns with moist soil management since the management mimics natural seasonal wetland dynamics. Any concerns will likely focus on potential changes to nutrient loading and the accumulation of methyl mercury from flooded soils. Relying as much as possible on evaporation to dewater management sites will maximize water quality benefits.

Managers of moist soil management sites will also need to keep in mind the federal regulations concerning baiting of waterfowl during the hunting season. In general, the manipulation of natural vegetation and the simple act of flooding standing crops does not constitute baiting. However, crop sharing agreements or other efforts to harvest some of the crops prior to flooding may raise baiting issues. Baiting regulations may apply to waterfowl taken outside of the baited area if their behavior has been influenced by a baited field (A summary of baiting regulations and enforcement is included in Appendix B). Any questions or concerns that baiting regulations may affect the proposed management should be resolved through discussions with the Division of Enforcement.

The key to minimizing and resolving regulatory issues is to consult with local agency representatives early in the project planning process. Determination of exemptions from potentially applicable regulations should be clearly documented and filed within the project proposal.

COST

Based on the development and management costs associated with existing moist soil management in Minnesota, we can expect that the initial cost for development (not including land acquisition) of traditional moist soil management designs may be as high as $3,000/surface acre or more depending on site characteristics and the amount of infrastructure required to achieve the desired benefits. Developing smaller projects with gravity flow systems will substantially reduce costs while incorporating flood reduction benefits into the design will likely increase costs.

For example, the Bois de Sioux Watershed District currently estimates flood reduction costs at approximately $1,000 per acre foot. On the other hand, the timed release of water from an existing upstream water control structure on a shallow lake or wildlife area may not incur any additional initial investment.

Annual operating costs and long-term maintenance will also be highly variable, but are expected to be near $300/acre for traditional management sites incorporating a pumping system. Additional costs will be incurred when moist soil sites are planted with crops. Minnesota will likely do well to heed Missouri's experience with planting crops on moist soil areas. Over time Missouri has reduced the planting of crops to only about 10% of their flooded acreage. Management refinements over the years have proven the attractiveness and nutritional benefits of natural annual plants (Table B).

TABLE B. NUTRITIONAL VALUE OF MOIST SOIL PLANTS

	Moist Soil Seeds	Inverts	Acorns	Row Crops
Protein	+	+ + +		
Lipid	+ +		+ + +	+ + +
Minerals	+ +	+ +		
Vitamins	+ +	+ +		

This emphasis on natural plants provides diverse habitat that benefits a variety of species. Minnesota's combination of earlier freeze up and greater mix of species in the harvest suggests that natural annual plants will provide broader benefits while still attracting key species. That said, the need for periodic disturbance to set back natural succession every 3 to five years provides the opportunity, if desired, to plant crops for that year on disturbed sites.

DESIGN CONSIDERATIONS

DIKES AND BASIN CONTOURING

The emphasis on shallow water during both spring and fall is critical to successful application of moist soil management. While dike and structure design must meet safety and longevity standards, there will be many cases where sufficient freeboard can be provided and still be relatively modest structures. The maximum water depths should be calculated with recognition of spring runoff, the watershed to basin ratio, and the target elevations for management. Sites providing flood reduction benefits should be designed with those stressors in mind. Dike designs that are equal to or greater than 6 feet in height have to be reviewed by DNR Dam Safety staff and will likely require a safety permit even when the dike will not affect public waters.

Moist soil units in the floodplain of large rivers need to be designed to handle extended flood events. Special design considerations such as orientation, wave protection berms, armoring, floodways, and emergency spillways should be incorporated into the initial construction to avoid remedial repairs after the project is in operation. Wind and wave erosion within the basins are also important considerations for design. When at full pool during spring and fall, open water areas will develop due to heavy waterfowl grazing and plant senescence. White caps can be common on basins, especially in November.

Larger moist soil management projects should ideally have several impoundments or cells that can be independently manipulated to promote the production of different foods to attract different groups of wildlife. Multiple basins also allow the manager to stagger the timing and rate of draw downs between individual cells to promote the greatest diversity of plants. A similar pattern should be repeated when the individual cells are flooded in the fall.

The location of dikes should ideally follow topographic contours to maximize pool size while maintaining the target depths of 1 foot or less. These contours will often provide the additional benefit of presenting a more natural appearing basin with additional edge. Although following contours may increase the length of potential dikes, it maximizes the effective pool and in the long run may provide the best cost benefit. The selected design should be driven by the project objectives.

Construction design must avoid removing material adjacent to the proposed dike locations for building material if that removal will create open water that will attract muskrats or beaver. The integrity of dikes can be undermined by tunneling and bank denning activities. These deeper areas can also become problem source areas for hybrid cattail encroachment and invasive fish survival.

The topography of the proposed basin may be so flat that contouring is necessary to provide a diversity of water depths. This work should be done after the dikes are constructed but before any flooding takes place. Carefully consider the need for this given that the maximum target flooding depth is approximately 12 inches. Tillage may be all that is needed to create the desired variability.

BLINDS AND HUNTER DENSITY

Developing specific hunting or observation blind locations can facilitate the management of both user numbers and location. During bottom contouring, consider the establishment of dry land corridors from high ground to the blind location to allow for easier access by physically challenged users.

The density of established blinds will vary somewhat with the size and configuration of the basin. In general blinds should be spaced no closer than 200 yards apart. The Missouri Department of Conservation avoids hunter densities greater than one party per 40 acres on their managed units.

INVASIVE SPECIES

Invasive species such as hybrid cattail, reed canary grass, purple loosestrife, and the invasive form of phragmities will be management challenges on moist soil management sites. Initial treatment should take place before the management pools are operational. In some cases control measures may be necessary for several years prior to activation of the water level management. In other cases control measures can be incorporated into ongoing management plans. Avoid any design specifications that will create deeper areas that cannot be dewatered and dried sufficiently to allow cultivation when necessary.

MANAGING WATER

There must be a system in place to efficiently remove water to facilitate the summer drawdown. In most situations the natural slope of the pool and a properly located outlet structure of adequate size will be all that is needed. However, there will be cases where something more elaborate will be required in order to dry the pool sufficiently to allow physical disturbance of the soil or the planting of crops. In these cases, open ditches within the management pool should be viewed with caution. A better approach might be to install a controlled drainage system with pattern tiling and an in-line water level control structure. An added benefit of such a system is more precise control of soil moisture horizons. In some rare cases a pumping system to remove water will be required.

In many cases the biggest design hurdle to overcome will be the infrastructure and water source to facilitate fall flooding. Based on experience it is fair to say precipitation will rarely arrive in a convenient manner. Gravity flow from a reliable upstream source is the best option in those few situations where it is available. Pumping systems provide the most refined control when a reliable source of surface water is available. Pumps must be adequately sized for the project recognizing that flooding rates will be very gradual. Pumps sized to run continuously during flooding rather than being turned off and on will have a longer life.

SPECIAL MANAGEMENT CONSIDERATIONS

In addition to traditional approaches to moist soil management, Minnesota has a number of opportunities for the application of some or all moist management techniques that may not be readily apparent. In taking advantage of these opportunities it is critical that the basic concepts of very shallow water, emphasis on annual plants, seasonal changes in water levels, and the need for reduction of disturbance to feeding birds be kept in mind. Examples of these management efforts are found in Appendix A.

NATURAL SEASONAL WETLANDS

Too often in Minnesota the few remaining seasonal wetlands in a local area will be dominated by cattail (usually hybrid) and reed canary grass. If the water regime is reasonably intact, the management thrust should be to apply disturbance to set back the succession of the emergent plants to moist soil annuals. Timely mowing, herbicide applications, summer burns, grazing, or mechanical soil disturbance are all possible treatments. Treatments to reduce cattail, including burning, should be applied post flowering in late July or early August for the best results. Reed canary grass responds best to treatments in early fall as it resumes replenishment of root systems. In addition, natural seasonal wetlands can often be enhanced by artificially adding water in the fall with pumping or gravity flow.

NATURAL PERMANENT WETLANDS AND SHALLOW LAKES

Quality issues on permanent wetlands are generally related to the presence of undesirable fish. Bringing water levels down in late summer will allow turtles and amphibians to locate alternative hibernaculum while insuring significant winterkill of fish. The lower water levels will also provide attractive feeding conditions for waterfowl and shorebirds. Bringing the water levels back up with spring runoff can help avoid undesirable expansions of hybrid cattail if the cattail is well rooted. The key moist soil concepts to be applied are the emphasis on shallow water depths and gradual changes in water levels (ideally 1 inch/day) during drawdowns and reflooding. The addition of pumps to the water level control systems can provide considerably greater precision to the water level management.

MISSISSIPPI RIVER POOLS

Over the last 10 decade a partnership including MN DNR, WI DNR, U.S. Fish and Wildlife Service, and the Army Corp of Engineers have been doing water level drawdown projects on various Mississippi River pools created by the lock and dam system. These projects are intended to improve aquatic vegetation, and have also resulted in substantially increased waterfowl use. While these are not traditional moist soil management projects they do provide many of the same benefits when the drawdowns can be timed for late spring and early summer. The drawdowns are challenging to achieve because of the coordination required to alter normal operating plans and the effects of weather.

DRAINED LAKE OR WETLAND BASINS

The traditional approach to the restoration of drained wetland and shallow lake basins has been to establish run out elevations as close as possible to historical levels. Given the need for seasonal wetland habitat, consideration should also be given to using the basin restoration to provide the needed balance (50% temporary and seasonal wetlands) within the existing wetland habitat complex. In many cases, better response by wetland wildlife, floodwater retention, and improved water quality can be accomplished by managing the site with moist soil management principles to increase available seasonal wetland habitat.

FARMED WETLAND BASINS

Previously drained cropland is rarely considered an opportunity for wetland management without ceasing crop production and fully restoring the wetland hydrology. However, it may also be possible to also consider the partial restoration of temporary and seasonal wetlands on farmed croplands while improving crop production. Assisting landowners with the replacement of open ditch or open tile inlet drainage systems with a controlled drainage system employing pattern tiling and in-line control structures can provide satellite temporary spring wetlands in areas where they contribute to existing wetland complexes. For example, the cost share agreement could include the commitment of the landowner to retain water until May 1st five out of ten years. The benefit to the landowner is improved soil drainage while the benefit to wildlife is the food provided by flooded harvested cropland.

Appendix

APPENDIX A. CASE STUDIES - SPECIAL MANAGEMENT CONSIDERATIONS

NATURAL SEASONAL WETLANDS

TEAL LAKE WMA

Ownership: MnDNR

Location: Section 30-T104N-R36W, Delafield Twp, Jackson County. Approximately two miles south of the Town of Wilder, MN.

Type: Natural Seasonal Basin

Habitat Complex: Located within the 120 acre Teal Lake WMA and adjacent to the more than 1700 acre Timber Lake WMA/WPA complex. It is also within 2 miles of Heron Lake.

Staffing Center: Windom Area DNR office is located approximately 10 miles from the wetland. Other labor and equipment needs are provided by the Talcot WMA unit headquarters approximately 20 miles away.

Site Topography: The wetland bottom is slightly irregular with changes of approximately one foot.

Soils: Clay Loam Ninety-acre Teal Lake with a watershed of approximately 800 acres. Farmers had used Teal Lake since the 1930's as a storage area for ag drainage water coming from their tile lines. Water was discharged from the lake only when the 10-inch tile outlet could handle it and no downstream flooding of agricultural crops occurred. Any remaining water in the lake, above a certain elevation, was then drained out after crop harvest to maximize storage potential for the following year.

Needed infrastructure: Control structure on the wetland was installed in 2006. New structures for Teal Lake are planned for the future to allow complete drawdown of the lake and still allow some discharge thru this wetland.

Applicable regulations: This is a restored wetland located on a WMA. Therefore there is considerable legal latitude in water level management.

ELDORADO WMA

Ownership: MNDNR

Location: Section 13, Eldorado Township, Pope County

Type: Natural Seasonal Basin

Habitat Complex: Several WMAs, WPAs and WRP sites occur within 4 square miles. The Eldorado WMA is 300 acres. There were three treated seasonal wetlands covering approximately 10 acres.

Staffing Center: 45 miles (I hour) from the area wildlife office

Site Topography: Flat.

Soils: Hydric

Water Source: Precipitation

Needed Infrastructure: No additional infrastructure was required. The basins were treated by haying in 2007 and mowing in 2010. The mowing was only partially successful due to wet conditions. Mid-summer cutting would be the most advantageous for encouraging annual moist soil plants.

Applicable Regulations: None

Cost: The haying incurred no direct costs. Mowing was accomplished at a rate of $60/hour covering 2-3 acres/hour.

DRAINED LAKE OR WETLAND BASINS

LINES WMA

Ownership: MNDNR

Location: Section 23, T113N, R40W, Lucas Township, Lyons County

Type: Drained Wetland Basin

Habitat Complex: There are six WMAs within 2 miles of Lines WMA. Lines WMA is 572 acres with a mixture of emergent wetland, grassland and cropland. The managed basin is a drained 51 acre shallow lake that will be typically flooded seasonally to cover 33 acres.

Staffing Center: The site is 21 miles from the area wildlife office.

Site Topography: Flat

Soils: Hydric

Water Source: County ditches and precipitation. There is also the possibility of capturing runoff from Lady Slipper Lake.

Needed Infrastructure: The outlet tile from the basin is fitted with an Agridrain plastic water control structure.

Applicable Regulations: None, although the Lyon County board was briefed on the planned installation.

Cost: TBA

FARMED WETLAND BASINS

WORKING LANDS INITIATIVE

Ownership: Private, Brent Olson
Location: Sections 1-5, 8-11 & 14-23, Otrey Township, Big Stone County
Type: Farmed Wetland Basin
Habitat Complex: Two drained wetland basins (5 acres and 10 acres) within a 14 mi^2 area of predominately private land with a land use dominated by row cropping, with some small grain crop, alfalfa haying and cattle grazing practices. There are several WPAs and WMAs within the focus area, as

well as FWS habitat easements and grassland easements. Some private wetlands and grasslands have temporary protection under Federal Conservation Programs. The area is within the MN River LCMR Corridor and also identified by DNR and FWS *thunderstorm* modeling as highest P*riority Wetland and Grassland Conservation* rankings.
Staffing Center: 32 miles to Lac qui Parle WMA headquarters.
Site Topography: Flat.
Soils: Hydric.
Water Source: Precipitation and contributing runoff.
Needed Infrastructure: Replace existing tile with pattern tile and tile gates (water control structures). Under a USFWS Partners for Fish and Wildlife agreement, the landowner agrees to close the tile gates after completion of fall tillage. On years when the tiled wetlands are to be planted to soybeans (roughly 5 times during the 10 year agreement for each wetland) he leaves the gates closed until May 1. The landowner has the option of either leaving open or closing the gates until early April on years when the drained wetlands are planted to crops other than soybeans. The net effect would be to change the function of these wetlands from a fully drained state to acting as ephemeral wetlands roughly 5 years out of 10.
Applicable Regulations: None. The two basins were previously drained and converted to cropland.
Cost: $19,000 (Landowner contributed $10,000 of the total, USFWS contributed $9,000)

APPENDIX B. OVERVIEW OF BAITING REGULATIONS

WATERFOWL HUNTING AND BAITING

Waterfowl and other migratory birds are a national resource protected under the Migratory Bird Treaty Act. Hunting waterfowl is a popular sport in many parts of the country. Federal and State regulations help ensure that these birds continue to thrive while providing hunting opportunities.

Federal baiting regulations define key terms for hunters and land managers, and clarify conditions under which you may legally hunt waterfowl. As a waterfowl hunter or land manager, it is your responsibility to know and obey all Federal and State laws that govern the sport. State regulations can be more restrictive than Federal regulations.

Waterfowl baiting regulations apply to ducks, geese, swans, coots, and cranes.

Federal regulations are more restrictive for waterfowl hunting than for hunting doves and other migratory game birds. You should carefully review the Federal regulations. You may also want to check our information on dove hunting and baiting.

WHAT IS BAITING?

You cannot hunt waterfowl by the aid of baiting or on or over any baited area where you know or reasonably should know that the area is or has been baited.

Baiting is the direct or indirect placing, exposing, depositing, distributing, or scattering of salt, grain, or other feed that could lure or attract waterfowl to, on, or over any areas where hunters are attempting to take them.

A baited area is any area on which salt, grain, or other feed has been placed, exposed, deposited, distributed, or scattered, if that salt, grain, or feed could serve as a lure or attraction for waterfowl.

THE 10-DAY RULE

A baited area remains off limits to hunting for 10 days after all salt, grain, or other feed has been completely removed. This rule recognizes that waterfowl will still be attracted to the same area even after the bait is gone.

WATERFOWL HUNTING ON AGRICULTURAL LANDS

Agricultural lands offer prime waterfowl hunting opportunities. You can hunt waterfowl in fields of unharvested standing crops. You can also hunt over standing crops that have been flooded. You can flood fields after crops are harvested and use these areas for waterfowl hunting.

The presence of seed or grain in an agricultural area rules out waterfowl hunting unless the seed or grain is scattered solely as the result of a normal agricultural planting, normal agricultural harvesting, normal agricultural post-harvest manipulation, or normal soil stabilization practice.

These activities must be conducted in accordance with recommendations of the State Extension Specialists of the Cooperative State Research, Education, and Extension Service of the U.S. Department of Agriculture (Cooperative Extension Service).

PLANTING

A normal agricultural planting is undertaken for the purpose of producing a crop. The Fish and Wildlife Service does not make a distinction between agricultural fields planted with the intent to harvest a crop and those planted without such intent so long as the planting is in accordance with recommendations from the Cooperative Extension Service.

Normal agricultural plantings do not involve the placement of seeds in piles or other heavy concentrations. Relevant factors include recommended planting dates, proper seed distribution, seed bed preparation, application rate, and seed viability.

A normal soil stabilization practice is a planting for agricultural soil erosion control or post-mining land reclamation conducted in accordance with recommendations of the Cooperative Extension Service.

Lands planted by means of top sowing or aerial seeding can only be hunted if seeds are present solely as the result of a normal agricultural planting or normal soil stabilization practice (see section on wildlife food plots).

HARVESTING & POST-HARVEST MANIPULATION

A normal agricultural harvest is undertaken for the purpose of gathering a crop. In general, the presence of long rows, piles, or other heavy concentrations of grain should raise questions about the legality of the area for waterfowl hunting.

A normal post-harvest manipulation first requires a normal agricultural harvest and removal of grain before any manipulation of remaining agricultural vegetation, such as corn stubble or rice stubble.

To be considered normal, an agricultural planting, agricultural harvesting, and agricultural post-harvest manipulation must be conducted in accordance with recommendations of the Cooperative Extension Service (i.e., planting dates, application rates, etc.). However, the Fish and Wildlife Service will continue to make final determinations about whether these recommendations were followed.

Hunters should be aware that normal harvesting practices can be unique to specific parts of the country. For example, swathing wheat crops is a part of the normal harvesting process recommended by the Cooperative Extension Service in some areas of the upper Midwest. During this process, wheat is cut, placed into rows, and left in the field for several days until it dries. Hunting waterfowl over a swathed

wheat field during the recommended drying period is legal. It is illegal to hunt waterfowl over swathed wheat that becomes unmarketable or that is left in the field past the recommended drying period because these situations are not normal harvests.

MANIPULATION OF AGRICULTURAL CROPS

You cannot legally hunt waterfowl over manipulated agricultural crops except after the field has been subject to a normal harvest and removal of grain (i.e., post-harvest manipulation).

Manipulation includes, but is not limited to, such activities as mowing, shredding, discing, rolling, chopping, trampling, flattening, burning, or herbicide treatments. Grain or seed which is present as a result of a manipulation that took place prior to a normal harvest is bait. For example, no hunting could legally occur on or over a field where a corn crop has been knocked down by a motorized vehicle. Kernels of corn would be exposed and/or scattered.

If, for whatever reason, an agricultural crop or a portion of an agricultural crop has not been harvested (i.e., equipment failure, weather, insect infestation, disease, etc.) and the crop or remaining portion of the crop has been manipulated, then the area is a baited area and cannot be legally hunted for waterfowl. For example, no waterfowl hunting could legally occur on or over a field of sweet corn that has been partially harvested and the remainder mowed.

WILDLIFE FOOD PLOTS

You cannot legally hunt waterfowl over **freshly** planted wildlife food plots where grain or seed has been distributed, scattered, or exposed because these plots are not normal agricultural plantings or normal soil stabilization practices. Wildlife food plots may be considered a normal agricultural practice, but they do not meet the definition of a normal agricultural planting, harvest, post-harvest manipulation, or a normal soil stabilization practice.

OTHER AGRICULTURAL CONCERNS

You cannot hunt waterfowl on or over areas where farmers feed grain to livestock, store grain, or engage in other normal agricultural practices that do not meet the definition of a normal agricultural planting, harvest, or post-harvest manipulation.

HUNTING OVER NATURAL VEGETATION

Natural vegetation is any non-agricultural, native, or naturalized plant species that grows at a site in response to planting or from existing seeds or other propagules.

Natural vegetation does not include planted millet because of its use as both an agricultural crop and a species of natural vegetation for moist soil management. However, planted millet that grows on its own in subsequent years is considered natural vegetation.

If you restore and manage wetlands as habitat for waterfowl and other migratory birds, you can manipulate the natural vegetation in these areas and make them available for hunting.

Natural vegetation does not include plants grown as agricultural crops. Under no circumstances can you hunt waterfowl over manipulated crops prior to a normal harvest. Nor can you hunt waterfowl over manipulated wildlife food plots or manipulated plantings for soil stabilization.

PROBLEM AREAS

FEEDING WATERFOWL AND OTHER WILDLIFE

Many people feed waterfowl for the pleasure of bird watching. It is illegal to hunt waterfowl in an area where such feeding has occurred that could lure or attract migratory game birds to, on, or over any area where hunters are attempting to take them. The 10-day rule applies to such areas, and any salt, grain, or feed must be gone 10 days before hunting. The use of sand and shell grit is not prohibited.

In some areas, it is a legal hunting practice to place grain to attract some State-protected game species (i.e., white-tailed deer). But these areas would be illegal for waterfowl hunting, and the 10-day rule would apply.

DISTANCE

How close to bait can you hunt without breaking the law? There is no set distance. The law prohibits hunting if bait is present that could lure or attract birds to, on, or over areas where hunters are attempting to take them. Distance will vary depending on the circumstances and such factors as topography, weather, and waterfowl flight patterns. Therefore, this question can only be answered on a case-by-case basis.

WHAT IS LEGAL?

You can hunt waterfowl on or over or from:

- Standing crops or flooded standing crops, including aquatic plants.
- Standing, flooded, or manipulated natural vegetation.
- Flooded harvested croplands.
- Lands or areas where grains have been scattered solely as the result of a normal agricultural planting, harvesting, or post-harvest manipulation.
- Lands or areas where top-sown seeds have been scattered solely as the result of a normal agricultural planting, or a planting for agricultural soil erosion control or post-mining land reclamation.
- A blind or other place of concealment camouflaged with natural vegetation.
- A blind or other place of concealment camouflaged with vegetation from agricultural crops, provided your use of such vegetation does not expose, deposit, distribute or scatter grain or other feed.

- Standing or flooded standing crops where grain is inadvertently scattered solely as the result of hunters entering or leaving the area, placing decoys, or retrieving downed birds. Hunters are cautioned that while conducting these activities, any intentional scattering of grain will create a baited area.

WHAT IS ILLEGAL?

Some examples of areas where you cannot hunt waterfowl include:

- Areas where grain or seed has been top-sown and the Cooperative Extension Service does not recommend the practice of top sowing (see section on wildlife food plots).
- Crops that have been harvested outside of the recommended harvest dates established by the Cooperative Extension Service (including any subsequent post-harvest manipulations).
- Unharvested crops that have been trampled by livestock or subjected to other types of manipulations that distribute, scatter, or expose grain
- Areas where grain is present and stored, such as grain elevators and grain bins.
- Areas where grain is present for the purpose of feeding livestock.
- Freshly planted wildlife food plots that contain exposed grain.
- Croplands where a crop has been harvested and the removed grain is redistributed or “added back” onto the area where grown.

THESE EXAMPLES DO NOT REPRESENT AN ALL-INCLUSIVE LIST OF WATERFOWL BAITING VIOLATIONS.

THE HUNTER’S RESPONSIBILITY

As a waterfowl hunter, you are responsible for determining whether your proposed hunting area is baited. Before hunting, you should:

- Familiarize yourself with Federal and State waterfowl hunting regulations.
- Ask the landowner, your host or guide, and your hunting partners if the area has been baited and inspect the area for the presence of bait.
- Suspect the presence of bait if you see waterfowl feeding in a particular area in unusually large concentrations or displaying a lack of caution.
- Look for grain or other feed in the water, along the shore, and on the field. Pay particular attention to the presence of spilled grain on harvested fields and seeds planted by means of top sowing.
- Confirm that scattered seeds or grains on agricultural lands are present solely as the result of a normal agricultural planting, normal agricultural harvesting, normal agricultural post-harvest manipulation, or normal soil stabilization practice by consulting the Cooperative Extension Service.
- Abandon the hunting site if you find grain or feed in an area and are uncertain about why it is there.

OTHER RESPONSIBILITIES

If you prepare lands for hunting, participate in such preparations, or direct such preparations, it is important for you to know and understand what practices constitute baiting. You should know what activities constitute baiting and when lands or other areas would be considered baited before such areas are hunted. If you bait or direct that an area be baited and allow waterfowl hunting to proceed, you risk being charged with an offense that carries significant penalties.

OVERVIEW OF OTHER REGULATIONS

Additional Federal and State regulations apply to waterfowl hunting, including those summarized below.

Illegal hunting methods. You cannot hunt waterfowl:

- With a trap, snare, net, rifle, pistol, swivel gun, shotgun larger than 10 gauge, punt gun, battery gun, machine gun, fish hook, poison, drug, explosive, or stupefying substance.
- From a sink box or any other low floating device that conceals you beneath the surface of the water.
- From a motorboat or sailboat, unless you shut the motor off or furl the sail and the vessel is no longer in motion.
- Using live birds as decoys.
- While possessing any shot other than approved nontoxic shot.
- From or by means, aid, or use of any motor vehicle, motor-driven land conveyance, or aircraft (if you are a paraplegic or are missing one or both legs, you may hunt from a stationary car or other stationary motor-driven land vehicle or conveyance).
- Using recorded or electrically amplified bird calls or sounds, or imitations of these calls and sounds
- With a shotgun that can hold more than three shells, unless you plug it with a one-piece filler that cannot be removed without disassembling the gun.

(The latter two restrictions do not apply during light-goose-only seasons in certain authorized areas of the Central and Mississippi Flyways.)

Shooting hours. You cannot hunt waterfowl except during the hours open to shooting.

Closed season. You cannot hunt waterfowl during the closed season.

Daily bag limit. You can take only one daily bag limit in any one day. This limit determines the number of waterfowl you may legally have in your possession while in the field or while in route back to your car, hunting camp, home, or other destination.

Wanton waste. You must make a reasonable effort to retrieve all waterfowl that you kill or cripple and keep these birds in your actual custody while in the field. You must immediately kill any wounded birds that you retrieve and count those birds toward your daily bag limit.

Tagging. You cannot put or leave waterfowl at any place or in the custody of another person unless you tag the birds with your signature, address, number of birds identified by species, and the date you killed them.

Rallying. You cannot hunt waterfowl that have been concentrated, driven, rallied, or stirred up with a motorized vehicle or sailboat.

Dressing. You cannot completely field-dress waterfowl before taking them from the field. The head or one fully-feathered wing must remain attached to the birds while you transport them to your home or to a facility that processes waterfowl.

Dual violation. A violation of a State waterfowl hunting regulation is also a violation of Federal regulations.

Duck stamp. If you are 16 or older, you must carry on your person an unexpired Federal migratory bird hunting and conservation stamp. You must validate your duck stamp by signing it in ink across the face before hunting.

Migratory Bird Harvest Information Program (HIP). Unless exempt from license requirementsin the State where you are hunting, you must enroll in the HIP and carry proof of current enrollment while hunting.

Protected birds. Federal law prohibits the killing of non-game migratory birds. Protected birds that you could encounter while waterfowl hunting include songbirds, eagles, hawks, owls, vultures, herons, egrets, and woodpeckers.

Banded birds. Waterfowl hunters are encouraged to report banded birds to the U.S. Fish and Wildlife Service toll-free bird band report hotline at 1-800/327-2263.

EXCERPTS FROM TITLE 50, CODE OF FEDERAL REGULATIONS, PART 20.21(I)

No persons shall take migratory game birds:

(i) By the aid of baiting, or on or over any baited area, where a person knows or reasonably should know that the area is or has been baited. However, nothing in this paragraph prohibits:

(1) The taking of any migratory game bird, including waterfowl, coots, and cranes, on or over the following lands or areas that are not otherwise baited areas --

(i) Standing crops or flooded standing crops (including aquatics); standing, flooded, or manipulated natural vegetation; flooded harvested croplands; or lands or areas where seeds or grains have been scattered solely as the result of a normal agricultural planting, harvesting, post-harvest manipulation or normal soil stabilization practice;

(ii) From a blind or other place of concealment camouflaged with natural vegetation;

(iii) From a blind or other place of concealment camouflaged with vegetation from agricultural crops, as long as such camouflaging does not result in the exposing, depositing, distributing or scattering of grain or other feed; or

(iv) Standing or flooded standing agricultural crops where grain is inadvertently scattered solely as a result of a hunter entering or exiting a hunting area, placing decoys, or retrieving downed birds.

(2) The taking of any migratory game bird, except waterfowl, coots and cranes, on or over lands or areas that are not otherwise baited areas, and where grain or other feed has been distributed or scattered solely as the result of manipulation of an agricultural crop or other feed on the land where grown, or solely as the result of a normal agricultural operation.

FOR MORE INFORMATION

If you have additional questions about waterfowl hunting and the law, contact the nearest U.S. Fish and Wildlife Service law enforcement office or one of the Service's regional law enforcement offices listed below. You should also consult the appropriate State conservation agency to determine what State regulations apply.

IL, IN, IA, MI, MN, MO, OH, WI

U.S. Fish and Wildlife Service
Office of Law Enforcement
P.O. Box 45, Federal Building
Fort Snelling, Minnesota 55111-0045
Telephone: 612/713-5320

APPENDIX C. REST AREA OPTIONS

SUMMARY OF OPTIONS FOR INCREASING WATERFOWL REST AREAS

There are several management approaches available through our present legal system. For the purposes of this discussion these approaches are grouped by their primary impact on the user. The impacts are restricting motorized use, restricting hunting and restricting trespass. The statutes providing the legal framework for these management options are presented at the end of the document.

RESTRICTING MOTORIZED WATERCRAFT

LOCAL WATER SURFACE USE MANAGEMENT

Purpose: Impose restrictions where appropriate on speed, travel direction, motor type and size, or time and area zoning. Most often used to address safety concerns although may be used to reduce disturbance to wildlife.

Procedure: Citizen concerns are brought to the local unit of government where the lake or river is located. Proposed ordinances are subject to a local public hearing and approval by the local unit of government. Must also be approved by the Department of Natural Resources.
Or
The Department of Natural Resources may restrict motorized use on lakes formally designated for wildlife management. See Wildlife Management Lake below.

Statute: 86B.205, 97A.101

WATERFOWL FEEDING AND RESTING AREAS

Purpose: Prohibit the use of motorized watercraft on part or all of a lake. May or may not allow the use of 12 volt or less electric motors.

Procedure: Department receives a petition from 10 local, resident, licensed hunters. Proposal is announced through news releases and considered at the annual public input meetings in late winter. Proposal and comments are considered for recommendation by the Division of Fish and Wildlife's Waterfowl Policy Committee. Department makes the final determination. Petitions should be presented to the Division of Fish and Wildlife before December 31 to insure consideration for the following year.

Statute: 97A.095 subd. 2

WILDLIFE MANAGEMENT LAKE (DESIGNATED WILDLIFE LAKE)

Purpose: Restrictions on motorized watercraft and recreational vehicles may be considered as part of the approved lake management plan.

Procedure: Lake must be formally designated for wildlife management through a public hearing process. Proposed restrictions are announced and considered at local public information meetings and the formal hearing as part of the draft management plan. Restrictions proposed for existing designated lakes are included in a draft revision of the management plan and considered at local input meetings. The plan is approved by the Department.

Statute: 97A.101

RESTRICTING HUNTING

STATE GAME REFUGE

Purpose: Prohibit the hunting or trapping of some or all wild animals within a geographic area. An example of a partial restriction would be a State Goose Refuge. May be open or closed at the discretion of the commissioner.

Procedure: May be designated by the Commissioner if more than 50% of the proposed area is publicly owned. The proposed area must be at least 640 acres in size unless it borders or includes a wetland or other body of water.

Or

May be designated by the Commissioner after receiving a petition signed by every landowner or lessee in the proposed area. Area must be at least 640 acres in size unless it borders or includes a wetland or other body of water. Petition must include an affidavit from the county auditor.

Or

May be designated by the Commissioner after receiving a petition describing a contiguous area or a public water and signed by 50 or more residents of the county where the proposed refuge is located. The area must be at least 640 acres unless it borders or includes a wetland or other body of water. Petition must include an affidavit from the county auditor.

Before designating a state game refuge, the Commissioner must hold a public hearing within the county in which the majority of the proposed refuge is located.

The commissioner may designate a game refuge under this section for only specified species. The game refuge must be posted accordingly.
Statute: 97A.085

RESTRICTING TRESPASS

MIGRATORY WATERFOWL SANCTUARY

Purpose: No trespass is allowed during the waterfowl hunting season.

Procedure: Must be part of a State Game Refuge or lake formally designated for wildlife management. See Wildlife Management Lake (page 1). May be designated by the Commissioner after receiving a petition from 10 resident, licensed hunters.

Statutes: 97A.095 subd.1

STATE DUCK SANCTUARY

Purpose: No trespass is allowed from September 1 through the end of the waterfowl hunting season.

Procedure: Must be within a state Wildlife Management Area (WMA). May be designated by the Division of Fish and Wildlife. At least two thirds of the acquired WMAs within a county must be open to public hunting.

Statutes: 97A.083, 97A.135 Subd. 1(a), 97A.137

STATE WILDLIFE SANCTUARY

Purpose: No trespass is allowed.

Procedure: Must be within a state Wildlife Management Area. May be designated by the Division of Fish and Wildlife. At least two thirds of the acquired WMAs within a county must be open to public hunting.

Statutes: 97A.083, 97A.135 Subd. 1(a), 97A.137

WHAT ABOUT VOLUNTARY RESTRICTIONS?

Voluntary restrictions have been a part of our waterfowl hunting heritage for nearly 100 years. They are usually landowner or hunter driven for safety reasons or to restrict motor use, hunting, or method of hunting. These restrictions can be quite successful when there is strong consensus, and peer group pressure, among the landowners and users of the area.

APPLICABLE STATUTES

Chapter 86
86B.205 Water surface use ordinance.

Subd. 1. Assistance. The commissioner shall develop and publish guidelines to assist counties adopting water surface use ordinances for waters within their jurisdiction.

Subd. 2. Surface use ordinances. (a) A county board may, by ordinance, regulate the surface use of bodies of water located entirely or partially within the county and not located entirely within the boundary of a single city or lake conservation district established by law.

(b) If a body of water is located within more than one county, a surface use ordinance is not effective until adopted by the county boards of all the counties where the body of water lies under section 471.59 or placed into effect by order of the commissioner under subdivision 9.

(c) With the authorization of an affected city or lake conservation district, a county board may assume and exercise the powers in subdivisions 2 to 5 with respect to bodies of water lying entirely within that city or lake conservation district. The regulation by the county of the surface use of a portion of a body of water located within the boundary of a city must be consistent with any city regulation existing on May 25, 1973, of the surface use of that portion of the body of water. After January 1, 1975, the ordinance must be consistent with the provisions of this chapter and rules of the commissioner under this chapter.

Subd. 3. Prior ordinances invalid without approval. A surface use zoning ordinance adopted under subdivisions 2 to 5 by a local governmental unit after May 25, 1973, is invalid unless it is approved by the commissioner.

Subd. 4. Approval of ordinances. A proposed surface use zoning ordinance must be submitted to the commissioner for review and approval before adoption. The commissioner must approve or disapprove the proposed ordinance within 120 days after receiving it. If the commissioner disapproves the proposed ordinance, the commissioner must return it to the local governmental unit with a written statement of the reasons for disapproval.

Subd. 5.

County regulatory authority. A county board may:

(1) regulate and police public beaches, public docks, and other public facilities for access to a body of water, except:

(i) regulations are subject to subdivision 6;

(ii) a county board may not regulate state accesses; and

(iii) a municipality may by ordinance preempt the county from exercising power under this subdivision within its jurisdiction;

(2) regulate the construction, configuration, size, location, and maintenance of commercial marinas and their related facilities including parking areas and sanitary facilities in a manner consistent with other state law and the rules of the commissioner of natural resources, the pollution control agency, and the commissioner of health, and with the applicable municipal building codes and zoning ordinances where the marinas are located;

(3) regulate the construction, installation, and maintenance of permanent and temporary docks and moorings in a manner consistent with state and federal law, permits required under chapter 103G, and sections 86B.111 and 86B.115;

(4) except as provided in subdivision 6, regulate the type and size of watercraft allowed to use the body of water and set access fees;

(5) subject to subdivision 6, limit the types and horsepower of motors used on the body of water;

(6) limit the use of the body of water at various times and the use of various parts of the body of water;

(7) regulate the speed of watercraft on the body of water and the conduct of other activities on the body of water to secure the safety of the public and the most general public use; and

(8) contract with other law enforcement agencies to police the body of water and its shore.

Subd. 6. Public access restrictions. The county board must allow the same types and sizes of watercraft and horsepower of motors to access and enter the lake or water body as are generally allowed to be operated on the lake or water body. Special use exceptions that are not dependent on lakeshore or property ownership may be granted by permit.

Subd. 7. County acquisition of public access. A county board may acquire by purchase, gift, or devise land for public access to a lake or stream and may improve the land as a park or playground if the land is less than ten acres and is

contiguous to the meander line of a navigable lake or stream wholly or partly within the county and not entirely within the corporate limits of a city.

Subd. 8. Advisory assistance. The county board may invite any municipal council or town board or the soil and water conservation district board of supervisors or watershed district board of managers to designate a representative to advise and consult with the county board on water use regulation and improvement.

Subd. 9. Watercraft use rules for local waters. (a) On request of a county, city, or town, the commissioner may, after determining it to be in the public interest, establish rules relating to the use of watercraft on waters of this state that border upon or are within, in whole or in part, the territorial boundaries of the governmental unit.

(b) The rules shall be established in the manner provided by sections 14.02 to 14.62, but may not be submitted to the attorney general nor filed with the secretary of state until first approved by resolutions of the county boards of a majority of the counties affected by the proposed rules.

(c) The rules may restrict:

(1) the type and size of watercraft and size of motor that may use the waters affected by the rule;

(2) the areas of water that may be used by watercraft;

(3) the speed of watercraft;

(4) the times permitted for use of watercraft; or

(5) the minimum distance between watercraft.

(d) When establishing rules, the commissioner shall consider the physical characteristics of the waters affected, their historical uses, shoreland uses and classification, and other features unique to the waters affected by the rules.

(e) The commissioner shall inform the users of the waters of the rules affecting them at least two weeks before the effective date of the rules by distributing copies of the rules and by posting of the public accesses of the waters. The failure of the commissioner to comply with this paragraph does

not affect the validity of the rules or a conviction for violation of the rules.

(f) The cost of publishing rules and of marking and posting waters under this subdivision shall be paid by the counties affected by the rules, as apportioned by the commissioner.

(g) Regulations or ordinances relating to the use of waters of this state enacted by a local governmental unit before January 1, 1972, shall continue in effect until repealed by the local governmental unit or superseded by a rule of the commissioner adopted under this subdivision.

HIST: 1990 c 391 art 9 s 10

Chapter 97A

97A.083 Hunting and fishing on state land.

The commissioner shall allow or prohibit hunting and fishing on state land as provided under the game and fish laws. The commissioner shall publish information on hunting and fishing on state land, including areas where taking wild animals is allowed or prohibited.

HIST: 1991 c 259 s 16

97A.085 Game refuges.

Subdivision 1. State parks. All state parks are designated as game refuges.

Subd. 2. Establishment by commissioner. The commissioner may designate a game refuge if more than 50 percent of the area is in public ownership. The game refuge must be a contiguous area of at least 640 acres unless it borders or includes a marsh, or other body of water or watercourse suitable for wildlife habitat.

Subd. 3. Establishment by petition of land holders. The commissioner may designate a land area or portion of a land area described in a petition as a game refuge. The petition must be signed by the owner, the lessee, or the person in possession of each tract in the area. A certificate of the auditor of the county where the lands are located must accompany

the petition stating that the persons named in the petition are the owners, lessees, or persons in possession of all of the land described according to the county records. The game refuge must be a contiguous area of at least 640 acres unless it borders or includes a marsh, or other body of water or watercourse suitable for wildlife habitat.

Subd. 4. Establishment by petition of county residents. The commissioner may designate as a game refuge public waters or a contiguous area described in a petition, signed by 50 or more residents of the county where the public waters or area is located. The game refuge must be a contiguous area of at least 640 acres unless it borders or includes a marsh, or other body of water or watercourse suitable for wildlife habitat. The game refuge may be designated only if the commissioner finds that protected wild animals are depleted and are in danger of extermination, or that it will best serve the public interest.

Subd. 4a. Hearing required. Before designating a game refuge under this section, the commissioner must hold a public hearing within the county where the majority of the proposed game refuge exists. Notices of the time and place of the hearing must be posted in five conspicuous places within the proposed game refuge at least 15 days before the hearing. A notice of the hearing must be published in a legal newspaper in each county where the area is located at least seven days before the hearing.

Subd. 5. Game refuge for specified game. The commissioner may designate a game refuge under this section for only specified species. The game refuge must be posted accordingly.

Subd. 6. Area included in game refuge. A state game refuge includes all public lands, waters, highways, and railroad right-of-way within the refuge boundary and, in the discretion of the commissioner, may include adjacent public lands and waters.

Subd. 7. Game refuge boundary posting. (a) The designation of a state game refuge is not effective until the boundary has been posted with notices that measure at least 12 inches.

(b) The notices must be posted at intervals of not more than 500 feet or less along the boundary. The notices must also be posted at all public road entrances to the refuges, except

where the boundary is also an international or state boundary in public waters. Where the boundary of a refuge extends more than 500 feet continuously through a body of water, instead of placing notices in the water, notices with the words, "Adjacent Waters Included," may be placed on the shoreline at the intersection of the boundary and the water 20 feet or less above the high-water mark and at intervals of 500 feet or less along the shoreline.

(c) A certification by the commissioner or the director of the Wildlife Division, or a certification filed with the commissioner or director by a conservation officer, refuge supervisor, or other authorized officer or employee, stating that the required notices have been posted is prima facie evidence of the posting.

Subd. 8. Modification or abandonment. A state game refuge may be vacated or modified by the commissioner under the same procedures required for establishment of the refuge, except that a refuge established or modified under subdivision 2 or 3 may be vacated or modified following a public hearing as specified in subdivision 4a.

HIST: 1986 c 386 art 1 s 16; 1987 c 149 art 1 s 10,11; 1992 c 462 s 6-11; 1997 c 187 art 3 s 23; 1997 c 226 s 17; 2002 c 323 s 4; 2004 c 215 s 2-4

97A.095 Waterfowl protected areas.

Subdivision 1. Migratory waterfowl sanctuary. The commissioner may designate by rule any part of a state game refuge or any part of a public water that is designated for management purposes under section 97A.101, subdivision 2, as a migratory waterfowl sanctuary if there is presented to the commissioner a petition signed by ten resident licensed hunters describing an area that is primarily a migratory waterfowl refuge. The commissioner shall post the area as a migratory waterfowl sanctuary. A person may not enter a posted migratory waterfowl sanctuary during the open migratory waterfowl season unless accompanied by or under a permit issued by a conservation officer or wildlife manager. Upon a request from a private landowner within a migratory waterfowl sanctuary, an annual permit must be issued to provide access to the property during the waterfowl season. The permit shall include conditions that allow no activity which would disturb waterfowl using the refuge during the waterfowl season.

Subd. 2. Waterfowl feeding and resting areas. The commissioner may, by rule, designate any part of a lake as a migratory feeding and resting area. Before designation, the commissioner must receive a petition signed by at least ten local resident licensed hunters describing the area of a lake that is a substantial feeding or resting area for migratory waterfowl, and find that the statements in the petition are correct, and that adequate, free public access to the lake exists near the designated area. The commissioner shall post the area as a migratory waterfowl feeding and resting area. Except as authorized in rules adopted by the commissioner, a person may not enter a posted migratory waterfowl feeding and resting area, during a period when hunting of migratory waterfowl is allowed, with watercraft or aircraft propelled by a motor, other than an electric motor with battery power of 12 volts or less. The commissioner may, by rule, further restrict the use of electric motors in migratory waterfowl feeding and resting areas.

Subd. 3. Hunting on Muskrat Lake. The commissioner may prohibit migratory waterfowl hunting on Muskrat Lake in Beltrami County by posting accordingly.

Subd. 4. Swan Lake Migratory Waterfowl Sanctuary. The land described in Laws 1999, chapter 81, section 2, is designated Swan Lake Migratory Waterfowl Sanctuary under subdivision 1.

HIST: 1986 c 386 art 1 s 18; 1987 c 119 s 1; 1991 c 259 s 23; 1993 c 231 s 11; 1999 c 81 s 1; 2000 c 495 s 30; 2004 c 215 s 5-7

97A.101 Public water reserves and management designation.

Subdivision 1. Reserves. The commissioner may designate and reserve public waters of the state to propagate and protect wild animals.

Subd. 2. Management designation. (a) The commissioner may designate, reserve, and manage public waters for wildlife after giving notice and holding a public hearing. The hearing must be held in the county where the major portion of the waters is located. Notice of the hearing must be published in a legal newspaper within each county where the waters are located at least seven days before the hearing.

(b) The commissioner may contract with riparian owners for

water projects under section 103G.121, subdivision 3, and may acquire land, accept local funding, and construct, maintain, and operate structures to control water levels under section 103G.505 to manage designated waters.

Subd. 3. Fishing may not be restricted. Seasons or methods of taking fish may not be restricted under this section.

Subd. 4. Restrictions on airboats, watercraft, and recreational vehicles. (a) The use of airboats is prohibited at all times on lakes designated for wildlife management purposes under this section unless otherwise authorized by the commissioner.

(b) The commissioner may restrict the use of motorized watercraft and recreational vehicles on lakes designated for wildlife management purposes by posting all public access points on the designated lake.

HIST: 1986 c 386 art 1 s 19; 1990 c 391 art 8 s 23; 1991 c 199 art 1 s 13; 1997 c 226 s 18

97A.135 Acquisition of wildlife lands.

Subdivision 1. **Public hunting and wildlife areas.** (a) The commissioner or the commissioner of administration shall acquire and improve land for public hunting, game refuges, and food and cover planting. The land may be acquired by a gift, lease, easement, purchase, or condemnation. At least two-thirds of the total area acquired in a county must be open to public hunting. The commissioner may designate land acquired under this subdivision as a wildlife management area for the purposes of the outdoor recreation system.

97A.137 Hunting, fishing, and trespassing in wildlife management areas.

Subdivision 1. Hunting and fishing. Wildlife management areas are open to hunting and fishing unless closed by rule of the commissioner or by posting under subdivision 2.

Subd. 2. Commissioner may restrict entry to designated areas. The commissioner may, by posting in accordance with section 97B.001, subdivision 4, designate areas within wildlife

management areas that are closed to entry for the purpose of providing areas where disturbance of wildlife can be minimized. A person may not enter an area posted under this subdivision except as authorized by rule or a permit issued by the commissioner.

Subd. 3. Use of motorized vehicles by disabled hunters. The commissioner may issue a special permit, without a fee, authorizing a hunter with a permanent physical disability to use a snowmobile or all-terrain vehicle in wildlife management areas. To qualify for a permit under this subdivision, the disabled person must possess:

(1) the required hunting licenses; and

(2) a permit to shoot from a stationary vehicle under section 97B.055, subdivision 3.

HIST: 1991 c 259 s 18; 1993 c 231 s 15; 2000 c 265 s 1

APPENDIX D. BOARD OF WATER AND SOIL RESOURCES POLICY FOR SITE MANAGEMENT OF CONSERVATION EASEMENT LANDS

POLICY
DECEMBER 17, 2008
VEGETATIVE MANAGEMENT AND ENHANCEMENT OF CONSERVATION EASEMENT LANDS

The MN Board of Water and Soil Resources (BWSR) recognizes the need to establish a policy and procedure for vegetative management and enhancement of conservation easements. This may include the practices of mowing, haying, grazing, harvest for seed or energy, prescribed burning, establishment of native grasses, forest land and wetland management. This policy applies to conservation easements held by the BWSR and is to compliment language already stated in the easement terms and conditions. Easements held in partnership with other agencies may have limitations that prohibit some or all of the activities outlined in this policy.

A Conservation Plan exists for each easement that identifies the location and type of practices found on the site. Easements require ongoing management to assure their quality is maintained. To that end this policy supports landowner efforts to achieve the highest degree of quality from every easement. A Management Plan needs to be developed and attached to the Conservation Plan for all activities being conducted on the easement site.

In some cases financial assistance will be available for certain practices, while others will be at the owner expense, entirely or partially. Certain practices may produce an economic return to the landowner, as long as wildlife benefits are protected. Practices to be implemented are best determined by the landowner in consultation with the SWCD and BWSR staff. The Management Plan shall be signed by all three parties. Consultation will be made with other professionals as deemed necessary by this group. Activities eligible for financial assistance must be consistent with the RIM program guidelines and approved by BWSR prior to practices being implemented.

Easement vegetation can be broken into three distinct cover types:

I. Grassland Management: For purposes of species diversity, wildlife habitat, water quality and erosion control, it may be necessary to undertake practices to enhance or modify some or all of the cover of a conservation easement. Practices may include:

A. Mechanical (mowing, haying, harvest, energy)
Mechanical methods can successfully manipulate growth stages of habitat. Annual mowing and mowing of entire stands is not allowed without technical justification from the resource manager preparing the management plan. Removal of biomass can increase the vigor of desirable vegetation, remove stored nutrients for water quality and provide a seed bed for restoration or enhancement. Generally, mechanical treatment will be done

no more frequently than once every third year, with no more than one third of the acreage mowed each year. In some cases it may be not be practical to manage smaller sites in stages, especially, if they are within a larger habitat complex. Mowing, haying, or harvest is not allowed during the nesting season May 15 to August 1. Minimum stubble heights are 4-6 inches. Any modifications to these criteria should be explained and specified in the management plan.

B. Chemical/Biological

Chemical Application: Herbicides used must follow label restrictions and be conducted in a way that maintains plant diversity and wildlife habitat. Care should be taken to minimize impacts to desired vegetation while controlling target species as specified in the Management Plan.

Biological Control: Biological control agents may be used for the control of invasive plant species. Minnesota DNR and Minnesota Department of Agriculture guidelines for using biological control agents should be followed and incorporated into the Management Plan.

C. Grazing

Livestock may be used to manage health and vigor of permanent vegetative cover when done in accordance with a grazing plan. Grazing on easement lands requires very careful management to assure the site is not overgrazed. Grazing should not be recommended unless the landowner fully understands the plan and is capable of managing the system. Grazing plans are to be developed according to applicable NRCS practice standards. Generally, grazing will not be done more often than once every three years on the same acres, and only one third of the area will be grazed each year. In some cases it may be not be practical to manage smaller sites in stages, especially if they are within a larger habitat complex. Grazing shall not occur during the primary nesting season of May 15 to August 1. Minimum stubble heights are 4-6 inches. Livestock will be removed from the site when the grass on the site is grazed to these stubble heights. Any modifications to these criteria should be explained and specified in the management plan.

D. Prescribed Burning

Improvement of plant species diversity, control of brush, and recycling of nutrients can be achieved by controlled burning. Burning will be allowed on cool season as well as warm season grass stands. The Management Plan will indicate the timing of burns for the area being treated. Appropriate permits must be obtained by the landowner prior to performance of a prescribed burn. Follow appropriate NRCS practice standards for prescribed burning.

E. Native Prairie Planting.

Enhancement or re-establishment of existing native prairie or replacement of cool season vegetation shall use native grasses & forbs of local eco-type where possible or as required by statute or rule. Quality of habitat can be increased by conversion of introduced grass stands to native grass stands. Follow appropriate NRCS practice standards for habitat management and restoration of declining habitats. BWSR has suggested native grass and forbs seed mixes available as well as recommendations for inter seeding of grasslands.

II. Forest Land Management: Necessary to provide regeneration, maintenance, or conversion of species to manage forest stands for wildlife benefits and stand density. Easement lands planted to trees need to be managed to maintain and improve preferred species that are critical to providing specific wildlife habitat. When tree cover is requested in the RIM conservation plan and established, the planting should not be considered the final product. The planting should be viewed as a component of the desired future condition to retain tree cover on the site. Harvesting can be done for a variety of purposes such as to create wildlife openings, manage browse for specific wildlife species, and for forest stand improvement. The Management Plan should outline the necessary steps to achieve this desired future condition.

III. Wetland Management:
Wetland management activities for vegetation and water level control are site specific. Wildlife habitat and nutrient reduction benefits of wetlands are affected by: vegetative quality, fish, minnows, invasive species, sedimentation, and water depth to name a few. Detailed plans exist for each restoration project that lay out the engineering of the restoration as well as any vegetative component. The BWSR is updating the MN Wetland Restoration Guide which should be consulted for further information. Any questions or requests regarding management of wetland areas should be directed to the BWSR Easement Program Manager.

APPENDIX E. REGULATIONS AFFECTING MOIST SOIL MANAGEMENT

Note: For all wetland-related regulations, Consult the "Wetland Regulation Checklist for DNR Projects," available at:
http://intranet.dnr.state.mn.us/wetland_water/regulations/index.html
The wetland checklist contains links to forms, contacts and other resources mentioned below.

Regulation	Regulatory Trigger	What to do:
Minnesota Wetlands Conservation Act	May apply if any wetlands, as determined by the 1987 Corps of Engineers Delineation Manual, are present prior to beginning the project. Permanently draining, filling or excavating within any pre-existing wetlands may require replacement; however, it may also qualify for a "No-loss" determination under Minn. Rules Chapter 8420.0415, item D. Seasonal water level manipulation will generally qualify for a "No-loss" determination under Minn. Rules Chapter 8420.0415, item C.	If pre-existing wetlands are present, prepare Part I of the "Minn. Local/State/Federal Application Form for Water/Wetland Projects" and convene a pre-project meeting (**early** in the planning process) with the WCA Technical Evaluation Panel (includes representatives from county Soil and Water Conservation District and the Board of Water and Soil Resources) to determine application of WCA.
Minnesota Public Waters Permits	May apply if the project will alter the course, current or cross-section of any public water identified on the county public waters inventory (PWI) map.	Consult the county PWI map to determine if any public waters are present at the project site. If so, or if there is any question, consult the DNR area hydrologist.
Federal Clean Water Act (CWA) Section 404	May apply if any wetlands, as determined by the 1987 Corps of Engineers Delineation Manual, are present prior to beginning the project. Ongoing MSM activities will generally be authorized under a general permit (RGP-03-MN, Item J), but this does not apply to initial construction. Wetlands restored or created under a MSM project potentially become jurisdictional wetlands under the CWA Section 404	If pre-existing wetlands are present, prepare Part I of the "Minn. Local/State/Federal Application Form for Water/Wetland Projects" and submit to appropriate Corps of Engineer project manager. Invite the Corps project manager to attend pre-project WCA Technical Evaluation Panel meeting (see above).

	program and future work in these wetlands may be subject to regulation.	
Federal Clean Water Act Section 401	Section 401 water quality certification is issued by the Minnesota Pollution Control Agency (MPCA). Discharge of mercury, phosphorus and nitrogen may be issues with MSM operations. Section 401 certification is typically handled as part of the CWA Section 404 permit process under the Corps of Engineers, but the MPCA can also regulate water quality issues under state authority.	Invite MPCA representative to attend pre-project WCA Technical Evaluation Panel meeting (see above).
Water Appropriation Permit	A DNR water use (appropriation) permit is required for all users withdrawing more than 10,000 gallons of water per day or 1 million gallons per year, either from groundwater or surface waters.	Consult the DNR area hydrologist
National Pollutant Discharge Elimination System (NPDES) Construction Stormwater	Applies to stormwater runoff from construction sites; administered by MPCA. Will apply if construction involves disturbance of an acre or more of soil. Most MSM projects should qualify for the general construction stormwater permit issued by MPCA, but this must be verified by the DNR project manager.	Consult the MPCA website for stormwater at: "http://www.pca.state.mn.us/index.php/water/water-types-and-programs/stormwater/stormwater.html" and follow the links for "Construction Stormwater"
Federal Rivers and Harbors Act Section 10	The construction of intake structures or, possibly even temporary pumping from federally designated navigable waters may require a Section 10 permit from the Corps of Engineers. For a list of navigable waters, see: http://www.mvp.usace.army.mil/docs/regulatory/mn_nav_waters.pdf	If the MSM project will directly affect, or appropriate water from any navigable water, contact the appropriate Corps of Engineers project manager.
Threatened and endangered species takings permits (state	Takings permits may be required for any project that may affect state or federally listed species.	Conduct a search of the DNR Natural Heritage Information System to determine if any state or federally listed species are present at the project site. If so, contact

and federal)		the DNR Endangered Species Permit Coordinator (651-259-5073) and the U.S. Fish and Wildlife Service (612-725-3548)
Environmental Review Program (Minnesota Environmental Policy Act, MEPA)	An environmental assessment worksheet (EAW) is mandatory for any of the following that might apply to MSM projects: • New permanent impoundment of water creating additional water surface of 160 or more acres or an additional permanent impoundment of water creating additional water surface of 160 or more acres, • Construction of a dam with an upstream drainage area of 50 square miles or more, • Diversion, realignment or channelization of any designated trout stream, or affecting greater than 500 feet of natural watercourse with a total drainage area of ten or more square miles unless exempted by part 4410.4600, subpart 14, item E, or subpart 17 • Projects that will change or diminish the course, current or cross-section of one acre or more of any public water or public waters wetland except for those to be drained without a permit pursuant to Minnesota Statutes, chapter 103G, • Projects that will change or diminish the course, current or cross-section of 40 percent or more or five or more acres of types 3 through 8 wetland of 2.5 acres or more, excluding public waters wetlands, if any part of the wetland is within a shoreland area, delineated flood plain, a state or federally designated wild and scenic rivers district, the Minnesota River Project Riverbend area, or the Mississippi headwaters area	

	An environmental impact statement is mandatory for: • Construction of a Class I dam • Projects that will eliminate a public water or public waters wetland A discretionary EAW should be prepared for any project that may have the potential for significant environmental effects.	

APPENDIX F. ADDITIONAL INFORMATION

SELECTED MOIST SOIL MANAGEMENT & RELATED REFERENCES

-NOTE: Some of these references contain recommendations designed for regions that vary greatly in their conditions from Minnesota. Therefore caution is advised when seeking to apply these to Minnesota.

Foraging Habitat for Bird Species or Bird Diversity in Wetland Design

http://el.erdc.usace.army.mil/elpubs/pdf/fwrs3-1.pdf

Moist-Soil Management Guidelines for the U.S. Fish and Wildlife Service Southeast Region

http://www.fws.gov/columbiawildlife/MoistSoilReport.pdf

Moist-Soil Management Advisor (MSMA)

http://www.fort.usgs.gov/products/software/msma/

MOIST-SOIL MANAGEMENT OF WETLAND IMPOUNDMENTS FOR PLANTS AND INVERTEBRATES

http://www.pwrc.usgs.gov/resshow/perry/impound/impound.htm

Shallow Water Management for Shorebirds

http://www.mn.nrcs.usda.gov/technical/ecs/wild/shorebirds.pdf

Hands, H. M. M. R. Ryan, and J. W. Smith. 1991. Migrant shorebird use of marsh, moist-soil, and flooded agricultural habitats. Wildl. Soc. Bull. 19: 457-464

http://www.jstor.org/stable/pdfplus/3782158.pdf

Wetlands of the Prairie Pothole Region: Invertebrate Species Composition, Ecology, and Management

http://www.npwrc.usgs.gov/resource/wetlands/pothole/past.htm

Benefits of Managing for Native Vegetation (DU)

http://southern.ducks.org/habitat_native-vegetation.php

13.4.6 Strategies for water-level manipulation in moist-soil systems- Waterfowl Management Handbook

http://www.nwrc.usgs.gov/wdb/pub/wmh/contents.html

DISCING EFFECTS ON SEED PRODUCTION AND DISTRIBUTION OF MOIST-SOIL VEGETATION

http://scholar.lib.vt.edu/theses/available/etd-033199-130907/unrestricted/chapter3.pdf

ASSESSING FUNCTIONAL INTEGRITY OF MOIST-SOIL MANAGED WETLANDS

BY COMPARISON WITH NEARBY NON-MANAGED SYSTEMS

http://www.msstate.edu/courses/ge14/Ervin%20et%20al%202003WRC.pdf

Upper Mississippi Valley/ Great Lakes Regional Shorebird Conservation Plan

http://www.fws.gov/shorebirdplan/regionalshorebird/downloads/UMVGL5.pdf

(discussion of moist soil management and several literature citations included)

Effects of Management Practices on Wetland Birds

http://www.npwrc.usgs.gov/resource/literatr/wetbird/wetbird.htm

Management of Habitat for Breeding and Migrating Shorebirds in the Midwest-Eldridge

http://www.mesc.usgs.gov/products/pubs/10000/pdf/13_2_14.pdf

Using Micro and Macrotopography in Wetland Restoration

http://www.nrcs.usda.gov/programs/wrp/states/In-final.pdf