2005

USDA-APHIS-WILDLIFE SERVICES
BISMARCK, NORTH DAKOTA

MONITORING REPORT AND AMENDMENT
TO THE ENVIRONMENTAL ASSESSMENT

"MANAGEMENT OF BLACKBIRD SPECIES TO REDUCE DAMAGE TO SUNFLOWER, CORN, AND OTHER SMALL GRAIN CROPS IN THE PRAIRIE POTHOLE REGION OF NORTH DAKOTA AND SOUTH DAKOTA"

Introduction

The U.S. Department of Agriculture, Animal and Plant Health Inspection Service, Wildlife Services (WS) prepared an environmental assessment (EA) in 1993 to address *"Management of Blackbird Species to Reduce Damage to Sunflower, Corn and Small Grain Crops in the Prairie Pothole Region of North Dakota and South Dakota."* A Finding of No Significant Impact (FONSI) and Decision were issued August 6, 1993 for the above EA. The 1993 Decision and FONSI were revisited in 1998 with the 1998 monitoring report and analysis again leading to a FONSI that was signed on February 20, 1998. The 1998 Decision concluded that a continuation of an integrated blackbird damage management program, including the use of frightening devices and cattail management to fragment cattail habitat in wetlands used by blackbirds was appropriate. All damage abatement methods are used as deemed appropriate through the WS Decision Model (Slate et al. 1992, USDA 1997) and implemented in a manner that is as environmentally responsible as possible. Copies of these documents are available from Wildlife Services, 2110 Miriam Circle, Suite A, Bismarck, North Dakota.

The purpose of this document is to review information and data that have become available since the EA was revisited and a new Decision and FONSI were issued in 1998 and the last monitoring report completed by WS. This review uses currently available information, adopted from research and the WS Management Information System, which in most cases is 2005 data.

Background

WS continues to receive requests to protect sunflower, corn, and small grains from blackbird damage in North Dakota and South Dakota; however, the vast majority of requests are received from agricultural producers for sunflower protection. Economic loss to sunflower production caused by blackbirds continues to be the major concern for sunflower producers in North Dakota and South Dakota and is often a reason given for abandonment of sunflower production. Sunflower production in the Northern Great Plains is important to local economies, with the economic impact of sunflower production in North Dakota and South Dakota exceeding $906 million annually (Bangsund and Leistritz 1995).

Peer et al. (2003) estimated the migrating population of blackbirds through the sunflower growing regions of the Great Plains at 75 million birds. Recent estimates of blackbird damage to sunflower indicate an annual loss in the Northern Great Plains at $5.4 million, with red-winged blackbirds (RWBL) (*Agelaius phoeniceus*) causing approximately $2.8 million of the damage (Peer et al. 2003). In 2001, blackbird damage to sunflower in the Southern Drift Plains[1] of North Dakota was estimated at 5.6% of the crop with a $2.5 million loss to sunflower producers (Wimberly et al. 2002).

Besides the beneficial economic impacts, sunflower production also has benefits to wildlife. Agricultural fields are generally regarded as poor breeding habitat for birds (Verner 1986). However, Boutin et al. (1999) found agricultural fields beneficial to birds as "stop-over" sites during migration. Stop-over sites provide places for shelter and for foraging opportunities (Burton 1992). Migrating birds tend to prefer foods high in fat content (Able 1999). McCormick et al. (1992) found sunflower seeds, grown for their oil content, contain 20% protein and 38-50% oil. The high protein and oil content of sunflower provides a valuable food source for numerous wildlife species (Martin et al. 1951).

With the harvest of sunflower occurring from September to early November (McCormick et al. 1992), the dense canopy of sunflower fields provides an opportunity for wildlife to find food and shelter when most other crops have been harvested. Rodenhouse et al. (1993) found 11 of 52 neotropical migrants and 9 of 53 resident bird species were closely associated with sunflower fields. Sayler and Trevor (1990) found 50 bird species in sunflower fields from June to August and Schaaf (2003) found 49 non-blackbird species using sunflowers as stop-over sites during the fall migration. Of these 49 non-blackbird species, 67% were identified as granivores and 21% being insect or fruit eaters. Blackbirds and house sparrows (*Passer domesticus*) however, are the only known bird species to cause significant damage to the sunflower crop (Besser 1978). The loss of sunflower production through abandonment due to blackbird damage would limit the availability of quality stop-over sites that sunflower fields provide to many neotropical birds.

Harvested sunflower fields are also used as stop-over sites by birds during spring migration. The limited availability of food sources in spring makes the availability of quality stop-over sites extremely important. The availability of sunflower seeds as ground forage that remains after harvest provides a needed food source during spring migration for many birds. Galle (2005) observed 32 bird species using sunflower stubble fields in spring with birds being significantly greater in sunflower stubble than other harvested grain fields.

Wetlands are a common landscape feature in North Dakota and eastern South Dakota. In North Dakota, wetland basins comprise nearly 3.5 million acres with an estimated 37 wetland basins per square mile (Reynolds et al. 1997). In eastern South Dakota, wetlands encompass nearly 9.8% of the total landscape (Johnson et al. 1997) with many of these wetlands classified as

[1] The Southern Drift Plains is a physiographic subunit which encompasses approximately 50% of the southern portion of the Prairie Pothole Region (PPR).

temporary, seasonal, and semi-permanent. These types of wetlands comprise nearly 2.4 million acres in North Dakota and 1.3 million acres in eastern South Dakota which are commonly found in all the physiographic regions of North Dakota and South Dakota (Stewart and Kantrud 1971, Johnson et al. 1997). Temporary, seasonal, and semi-permanent wetlands are characterized by shallow basins and are often dominated by emergent vegetation (Stewart and Kantrud 1971, Cowardin et al. 1979, Kantrud 1983).

Emergent vegetation historically associated with these wetlands was sparse stands of bulrush (*Scirpus* spp.) and common cattail (*Typha latifolia)* (Kantrud 1992). The exotic narrow-leaved cattail (*T. angustifolia* L.) was first reported in North Dakota in the early 1940s and by the 1970s had spread throughout the region hybridizing with the native cattail to form *T.* x *glauca* Godron (Stevens 1963). *T.* x *glauca* is a fast growing, robust cattail that forms dense homogonous stands that tolerate seasonal water draw-downs and inundation (Weller 1975, Davis and van der Valk 1978).

Cattail growth is dependent on water depth within wetland basins (Steenis et al. 1959). Common cattail is controlled when immersed in 64 cm or more of water (Steenis et al. 1959) and narrow-leaved cattail is controlled at water depths of 100 cm or more (Grace and Wetzel 1982). *T.* x *glauca* displays morphological characteristics intermediate of the two parent species (Smith 1967) with control likely to occur when immersed in water depths intermediary of the two parent species.

The water depth in the typical Prairie Pothole Region (PPR) wetland fluctuates throughout the year based on spring snow melt and annual rainfall (Stewart and Kantrud 1971, Cowardin et al. 1979, Kantrud 1983, Euliss and Mushet 1996). Euliss and Mushet (1996) reported water depths fluctuated in seasonal and temporary wetlands an average of 11.8 cm and 13.7 cm, respectively. Water depths in temporary wetlands averaged 22 cm, seasonal wetlands averaged 49 cm, and semi-permanent wetlands averaged 51 cm during a two year period (Euliss and Mushet 1996). Based on these averages, temporary, seasonal, and semi-permanent wetlands often do not exceed the water depth needed to prevent cattail growth or regrowth even at their highest water levels but rather provide ideal cattail growing conditions.

The PPR covers 50.9% of the land area in North Dakota and covers the eastern half of South Dakota (Stewart 1975, Johnson et al. 1997). Cattails covered 36.6% of the wetland basins in those wetlands containing cattails occupying approximately 2.3% of the land surface area or nearly 547,000 acres in the PPR of North Dakota (Ralston 2005). Given the average acreage of cattails treated under the current program (Table 1), WS annually treats less than 1% of the estimated 547,000 acres of cattails in North Dakota (Ralston 2005) and cattail management can be effective for at least 2 years and up to 4 years in treated wetlands[2] (Linz et al. 1992a, Linz et al. 1992b, Linz et al. 1995). If cattail regrowth to pre-treatment levels does not occur until 4 years post-treatment, WS' current cattail management program (CMP) would reduce the total

[2] Cattail seed and rhizomes would promote new growth in managed wetlands if water depths are adequate for regrowth.

cattail acreage by less than 4% in the PPR of North Dakota[3] under a worse case scenario. The total cattail acreage in South Dakota is unknown. Given the total cattail acreage treated in South Dakota since 1991 (Table 1), the effect of the CMP on the total cattail acreage in South Dakota is likely much less than 1% (R. Wimberly, USDA/APHIS/ WS 2005, pers. comm.). For purposes of this document, treated cattail acres will refer to those acres that actually received glyphosate application resulting in dead cattails. Treated acres consist of 70% of the total cattail acres in each wetland. Managed cattail acres will refer to those cattail acres receiving glyphosate application plus the cattail acres of the 30% that are untreated (*i.e.,* managed cattail acres are the total cattail acreage in the wetland).

Table 1. Cattail Acres Treated and Managed Cattail Acres[1] in North Dakota and South Dakota Wetlands.

Year	North Dakota		South Dakota	
	Treated	Managed	Treated	Managed
1991	1,407	2,010	155	221
1992	3,512	5,017	302	431
1993	2,117	3,024	435	621
1994	1,765	2,521	18	25
1995	3,076	4,394	40	57
1996	5,849	8,355	471	672
1997	4,605	6,578	280	400
1998	4,432	6,331	275	392
1999	1,436	2,051	0	0
2000	2,833	4,047	18	25
2001	3,654	5,220	481	687
2002	4,269	6,098	67	95
2003	2,633	3,761	124	177
2004	3,450	4,928	0	0
2005	3,104	4,434	264	377

[1] Managed cattail acres include the 70% treated cattails in each wetland plus the 30% untreated cattails.

Being a gregarious species, blackbirds are very conspicuous in the spring and fall, forming flocks ranging from a few birds to more than a million blackbirds. The primary roosting and loafing habitat used by large flocks of blackbirds in North Dakota and South Dakota are dense stands of cattails in shallow wetlands. Lutman (2000) documented six blackbird roosts in Stutsman County, North Dakota exceeding 10,000 birds in August and September, with one roost exceeding 50,000 blackbirds during one survey period.

Sunflower damage is highly correlated with wetlands dominated by cattails that act as blackbird roosting and loafing sites (Otis and Kilburn 1988, Linz et al. 1993). A positive relationship also exists between acres of living cattail, the number of blackbirds, and sunflower damage (Linz et al. 1995). Communal roosting blackbirds prefer dense cattails stands that provide protection from predators (Weatherhead 1983) and harsh weather conditions. Fragmenting dense cattail stands in wetlands disperses blackbirds from those wetlands by reducing optimal cattail habitat. However, controlling cattails can be difficult because of the large rhizome root system that reestablishes cattail growth even when the emergent foliage is removed. Thus, mechanical methods such as mowing, burning, and discing that remove the emerged foliage have limited success (Beule 1979) and have limited applicability when standing surface water prevents the use of these methods. Using a systemic aquatic herbicide to kill the emerged cattail foliage and the rhizome root system was effective in dispersing roosting blackbirds from wetlands near sunflower fields (Linz et al. 1992a, Linz et al. 1992b).

[3] If WS treated 6,000 acres of the estimated 547,000 acres of cattails in the PPR of North Dakota, about 1.1% of the cattail acreage would be treated in North Dakota. If cattail regrowth did not occur for up to four years post-treatment, under a worst case scenario of cattail regrowth, about 4.4% of the total cattail acreage in the PPR of North Dakota would be affected. When combined with South Dakota, the affect on the total cattail acreage in the PPR of both states is likely much less than 1% annually.

Alternatives That Were Fully Evaluated in the EA

The following Alternatives were developed and analyzed in the original EA. A summary of the alternatives identified in the EA follows below:

Alternative 1 - No Action

This alternative precludes WS from conducting blackbird damage management activities in North Dakota and South Dakota. The Act of March 2, 1931 (46 Stat. 1468; 7 U.S.C. 426-426b) as amended, and the Act of December 22, 1987 (101 Stat. 1329-331, 7 U.S.C. 426c) authorize WS to conduct wildlife damage management. This Alternative violates WS statutory obligation to provide or assist with wildlife damage management. WS activities are conducted at the request of and in cooperation with other federal, state, and local agencies, private organizations, and individuals.

Alternative 2 - Frightening Devices only

Under this alternative, WS would recommend, distribute, and loan frightening devices for reducing blackbird damage. Frightening devices such as pyrotechnics, propane exploders, and electronic distress calls would be recommended and/or made available to agricultural producers experiencing blackbird damage to an agricultural crop. Frightening devices use auditory stimuli to disperse birds from desired areas through negative association with an adverse stimulus. When used correctly and in conjunction with other techniques, frightening devices can be more effective at dispersing birds from crop fields. However, selection of this alternative would prevent WS from utilizing other available damage management techniques, that when used with frightening devices, are more effective in reducing blackbird damage.

Alternative 3 - Habitat Management only

This alternative would restrict WS to conducting an operational CMP without making available frightening devices or operationally using other non-lethal techniques to reduce blackbird damage. Fragmenting cattails in wetlands can effectively disperse blackbirds from those wetlands by reducing cattail habitat. The most effective method for reducing cattails is the use of a systemic aquatic herbicide, such as glyphosate, which is registered by the U.S. Environmental Protection Agency (EPA) for that purpose. Agricultural producers could continue to use cultural practices to reduce cattails in wetlands used by blackbirds. Selection of this alternative would limit the availability of harassment techniques that, when used in conjunction with cattail management, can be more effective than using a single technique to reduce blackbird damage.

Alternative 4 - Aerial Hazing only

The aerial hazing alternative would require WS to conduct aerial operations using small aircraft to disperse blackbirds from agricultural fields. Disrupting the behavior and feeding patterns of blackbirds can be accomplished using an aircraft. Given the scope of the blackbird damage problem in North Dakota and South Dakota, numerous aircraft are required to effectively disperse blackbirds from agricultural fields. However, the use of aircraft to disperse birds can be extremely hazardous. The low-level flight needed to effectively disperse birds along with the flocking behavior of blackbirds significantly increases the likelihood of birds striking the aircraft. These bird strikes can result in catastrophic failure of the aircraft which could potentially place pilots and crews in significant harm. Given the concern for aerial safety, the hazing of birds does not currently fit within the use profile for WS' or contract aircraft. For this reason, aerial hazing will not be considered as a viable alternative or as a component of any other alternative.

Alternative 5 - Integrated Management (Proposed Action)

The integrated management alternative would incorporate methodologies described in Alternative 2 and Alternative 3. The original analysis of an integrated damage management program included the use of aerial hazing. However, due to safety concerns described in Alternative 4, aerial hazing will not be considered as part of an integrated management plan in this amendment. WS would incorporate frightening devices, cattail management techniques, and technical assistance in an integrated management approach to reduce blackbird damage to agricultural crops in North Dakota and South Dakota. This alternative includes the use of an aquatic glyphosate to treat up to 6,000 acres of cattails annually in North Dakota and South Dakota along with the loaning and distributing of frightening devices and providing technical assistance to agricultural producers. Under the proposed amendment to the original EA, WS would treat up to 8,000 acres of cattails in wetlands annually as needs are identified, as requested by agricultural producers experiencing losses from blackbirds, and as funding permits.

PROPOSED AMENDMENT TO THE ORIGINAL EA

The PPR is the primary sunflower growing region of North Dakota and South Dakota. However, the production of sunflower and other crops susceptible to blackbird damage are also grown outside this physiographical region (NDASS 2004). Discussion and analysis in the original EA evaluated blackbird damage management in the PPR of North Dakota and South Dakota where the primary sunflower production occurred and traditionally where blackbird damage was severe. Since the original Decision and FONSI were signed, requests for assistance for blackbird damage management in North Dakota and South Dakota has expanded outside the traditional sunflower production area of the PPR.

The *"Management of Blackbird Species to Reduce Damage to Sunflower, Corn and Small Grain Crops in the Prairie Pothole Region of North Dakota and South Dakota"* EA is being amended to assess the potential effects of increased requests for assistance and activities conducted or recommended by WS. Under this amendment, WS would continue with a nonlethal, integrated blackbird damage management program (*i.e.*, technical assistance, loaning frightening devices, and conducting cattail management) to protect sunflower, corn, and other small grains with the amendment to increase the maximum cattail acres treated annually from 6,000 acres to 8,000 acres. The management of up to 8,000 acres of cattails in North Dakota and South Dakota is an increase of 2,000 acres over the acreage discussed and analyzed in the original EA. Annually, agricultural producer requests for assistance through the CMP can exceed 6,000 acres. The proposed 2,000 acre increase would allow WS to adequately address these requests as needs are identified, as requested by agricultural producers experiencing losses due to blackbirds are received, and as funding permits. Recent research estimates cattails occupy approximately 547,000 acres in the PPR of North Dakota which constitutes 2.3% of the surface of area of the PPR in North Dakota (Ralston 2005). The cattail acres in the PPR of South Dakota are unknown.

Under the Amendment, increasing the maximum treated cattail acreage to 8,000 acres annually would account for an estimated 1.5% of the total cattail acreage in the PPR of North Dakota. The greatest amount of fragmented cattail habitat, over a 4-year period, would be 32,000 acres if cattail regrowth does not occur for 4 years or less than 6% of the total cattail acreage in the PPR of North Dakota. When combined with the total cattail acreage in the PPR of South Dakota and cattails found in other physiographic regions of both states, the affects to the environment and wildlife from an increase of 2,000 treated cattail acres would be minimal.

Discussion and analysis of the proposed 2,000 acre increase is addressed below in "Issues Not Analyzed in the Original EA."

WS' Cattail Management Program

Since 1991, WS has assisted agricultural producers in North Dakota and South Dakota sustaining blackbird damage to sunflower by fragmenting optimal cattail habitat near sunflower fields[4] using an aquatic glyphosate (N-(phosphonomethyl) glycine) herbicide. Glyphosate is applied aerially (primarily with a helicopter) in linear strips approximately 50 feet wide with an approximate 20 foot buffer of untreated cattails between spray lanes. Only 70% of the total cattail acreage in each wetland receives treatment and only areas of dense cattail stands. This application pattern is designed to disperse blackbirds from wetlands by fragmenting available cattail habitat while leaving habitat for other wildlife that utilize cattails (Linz et al. 1992a, Linz et al. 1992b, Linz et al. 1995, Linz et al. 1996). Aerial surveys are conducted of all enrolled areas prior to treatment to determine cattail acreage and the eligibility of enrolled wetlands. Application of glyphosate occurs on 70% of the total cattail acreage present in each wetland based on aerial surveys conducted prior to application and by GPS units used by applicators. Applicators are instructed to only spray continuous cattail acres and only when winds are less than 8 miles/hour (mph). Aerial applicators are also required to thoroughly clean all mixing and holding tanks prior to spraying cattails for the CMP.

In 1996, WS' CMP treated 5,849 acres of cattails in North Dakota which is the largest amount treated in any year of the program (Table 1). The average cattail acreage treated annually by WS from 1991 to 2005 is 3,209 acres. Ralston (2005) estimated that WS' CMP treated 1.07% of the

[4] Wetlands with greater than 5 acres of continuous cattails are eligible for the program. WS treats 70% of the cattail acres in each wetland.

cattail acreage present during 1996 in North Dakota. Analysis of color infrared images taken in 2002 estimated the total cattail acreage in the PPR of North Dakota at 547,000 acres with the CMP treating an estimated 0.78% of the cattail acreage in 2002 (Ralston 2005). Over the extent of the CMP, an average of about 0.6% of the cattail acreage is treated annually based on 547,000 acres of cattails (Ralston 2005). Regrowth of cattails in treated wetlands generally occurs 2 to 4 years after initial treatment with cattail growth dependent on water depth[5] within wetland basins (Steenis et al. 1959). Cattail acreage in North Dakota and South Dakota fluctuates based on precipitation levels. Therefore, requests for assistance through the CMP are likely to be fewer during years with less precipitation since cattails require adequate soil moisture to allow for growth. WS' CMP will not likely intensify the loss of cattail acreage during dry years since requests for assistance are lower.

Management of dense cattails in wetlands, at a 70:30 ratio of open water to cattails, has been shown to be economically beneficial to both sunflower producers and wildlife through an increase in waterfowl production and the viability of sunflower production in North Dakota and South Dakota (Baltezore et al. 1994, Leitch et al. 1997).

Glyphosate Aquatic Herbicide

Glyphosate is a broad-spectrum, post emergent herbicide registered by the EPA in 1974 and reregistered in 1993 (EPA 1986, EPA 1993). Glyphosate is registered under several trade names with different formulations for control of terrestrial and emerged aquatic plants. For purposes of this analysis, glyphosate refers to the aquatic formulation which consists of the isopropylamine salt of N-(phosphonomethyl) glycine only. The commonly used terrestrial products often contain non-herbicidal components in the form of surfactants which are not present in the aquatic formulation.

Once applied to the foliage, glyphosate is translocated throughout the plant and inhibits protein synthesis by blocking the shikimic acid pathway (Cole 1985, Alibhai and Stallings 2001), a metabolic pathway not present in mammals, birds, fish, reptiles, and insects (Franz et al. 1997, Alibhai and Stallings 2001). Plants treated with glyphosate show stunted growth, yellowing, leaf wrinkling, and wilting with tissue death occurring between 4 and 20 days (Franz et al. 1997).

The potential exists for glyphosate to reach surface water when treating emerged aquatic plants. On contact with surface water, glyphosate dissipates rapidly by: (1) adhering to suspended soil particles and sediment, (2) by microbial degradation, and (3) photolysis (Bronstad and Friestad 1985). Glyphosate is stable to hydrolysis and photodegradation (EPA 1993). Microorganisms readily metabolize it into amino methyl phosphonic acid (AMPA) in soils which further degrades to CO_2 (EPA 1993).

The half-life of glyphosate in soils ranges from 3 to 140 days. Both glyphosate and AMPA bond strongly to soil and have a low leaching potential with vertical movement not expected to exceed

[5] Water depth fluctuates seasonally in the seasonal, temporary, and semi-permanent wetlands found in North Dakota and South Dakota (Stewart and Kantrud 1971, Cowardin et al. 1979, Kantrud 1983).

the 6 inch soil layer (EPA 1993). Volatization from soils was not a significant dissipation mechanism based on the low vapor pressure of glyphosate (EPA 1993).

The dermal and oral acute toxicity of glyphosate is relatively low. EPA (1993) ranks glyphosate in Toxicity Category III [6]. As an eye irritant, EPA (1993) ranks glyphosate in Toxicity Category III and as a dermal irritant in Toxicity Category IV.

The EPA (1993) reported the toxicity of glyphosate to cold and warm freshwater fishes ranged from "slightly non-toxic to practically non-toxic." In addition, glyphosate does not bioaccumulate in fish, but applications to aquatic vegetation in water bodies where low levels of dissolved oxygen or high temperatures exist could be hazardous to fish due to eutrophication from decaying vegetation (Folmar et al. 1979). Toxicity studies with aquatic invertebrates demonstrated glyphosate was "practically non-toxic" and EPA (1993) reported the effects of glyphosate on mammals and birds are minimal and not expected to negatively impact endangered terrestrial or aquatic organisms.

In addition, the use of pesticides by WS in all instances is regulated by the EPA through FIFRA, by MOUs with other agencies, by North Dakota and South Dakota pesticide laws, and by WS Directives. WS' final programmatic Environmental Impact Statement (EIS), *"Animal Damage Control Program,"* evaluated blackbird damage management including the use of glyphosate in the CPM (USDA 1997). Analysis in the EIS of potential effects on human and nonhuman receptors showed the risks of hazards are low when used according to the label for habitat management and did not require a Quantitative Risk Assessment (QRA)[7] (USDA 1997, Appendix P). Glyphosate scored a 27[8].

Table 2. 2005 North Dakota Cattail Management Program Summary.

County	Treated	Managed
Barnes	163	233
Dickey	54	77
Grand Forks	15	21
Griggs	91	130
LaMoure	109	156
Logan	6	9
Nelson	785	1,121
Pierce	82	117
Ramsey	1,484	2,120
Sargent	13	19
Steele	109	156
Stutsman	87	124
Walsh	106	151

FY05 Blackbird Damage Management Program Results

WS continues to administer and promote an integrated blackbird damage management program through loaning and dispensing equipment, technical assistance projects, and the CMP. Technical assistance for blackbird damage was provided to 168 individuals including distribution of 557 leaflets. A total of 70 propane cannons were loaned and 3,400 pyrotechnics were distributed to individuals experiencing blackbird damage to sunflower, corn, and wheat. Aerial surveys were conducted in July 2005 by WS personnel to assess wetland areas enrolled in the 2005 CMP. Wetlands containing

6 The EPA uses an acute toxicity rating system with Toxicity Category I having the highest degree of acute toxicity to Toxicity Category IV having the lowest acute toxicity.

7 The QRA is based on the potential for nontarget species to be exposed to a particular chemical combined with the toxicological characteristics of the chemical to determine the potential risks to nontarget species.

8 A risk score below 35 (no probable risk) did not require a QRA (USDA 1997, Appendix P).

few to no cattails were excluded from the CMP.

In 2005, WS treated 3,368 acres of cattails in North Dakota and South Dakota using a glyphosate-based aquatic herbicide (Table 1). The CMP provided service to 49 cooperators in North Dakota in 13 counties (Table 2) and 2 individuals in 2 counties in South Dakota. Spraying began on August 15 and terminated on September 06. Applications were conducted using a helicopter equipped with microfoil booms with Accuflow nozzles to reduce drift. To further reduce drift, pilots were instructed not to spray in winds exceeding 8 mph. Applicators were also required to thoroughly clean all holding and mixing tanks before treating cattails to prevent accidental application of other pesticides into wetlands. Application rates were 4 pints of glyphosate per acre, 0.5 pints of surfactant per acre, and 5 gallons of water per acre.

Issues Not Analyzed in the Original EA

Issue 1: Fragmentation of Cattail Habitat to Blackbird Populations Sustainability

The three species of blackbirds primarily responsible for agricultural damage in North Dakota and South Dakota are the RWBL, yellow-headed blackbird (YHBL) (*Xanthocephalus xanthocephalus*), and common grackle (COGR) (*Quiscalus quiscula*). For purposes of this document, blackbirds will refer to these three species.

An estimated 52 million blackbirds breed in the PPR with an estimated 75 million blackbirds migrating through the PPR annually (Peer et al. 2003). Cattails provide the primary breeding habitat for RWBL and YHBL while COGR prefer nesting in deciduous and coniferous trees (Homan 1992). As a result of WS' CMP, the availability of cattail breeding habitat could be slightly reduced for RWBL and YHBL (*i.e.*, 0.78% in 2002 and less than 1.5% if 8,000 acres were treated). Since COGR prefer to nest in deciduous and coniferous trees, they are not likely to be adversely affected by fragmentation of cattails in wetlands. The loss of roosting habitat through cattail fragmentation from the CMP is expected to have minimal affects on blackbird populations during their spring and fall migration given the availability of other roosting habitat in North Dakota and South Dakota.

The peak breeding period for RWBL is mid-May to late July with the peak of YHBL breeding occurring from mid-May to mid-July (Stewart 1975). Application of an aquatic glyphosate herbicide to cattails during the CMP could occur between 15 July and 15 September annually. However, most applications occur in August which is after the peak breeding periods of the two blackbird species that prefer cattail habitat for breeding. Treated cattails begin to show yellowing and wilting 4 to 20 days after treatment (Franz et al. 1997) yet are erect with no destruction of nests or nesting habitat the year of treatment.

Using the amended increase of up to 8,000 treated cattail acres, the fragmentation of cattail habitat from WS' CMP represents a maximum of 50 mi^2 (*i.e.*, a maximum of 8,000 acres treated/year over 4 years). The remaining 30% of cattail acreage not treated under the CMP would be available cattail habitat. Breeding blackbird surveys conducted in May 2004 in the PPR of North Dakota and South Dakota estimated a breeding RWBL population of 58 males/mi^2

(R. Wimberly, USDA/APHIS/WS, unpub. data). With one female per male, an estimated 725 breeding pairs of RWBL could be displaced annually from wetlands if 8,000 acres of cattails were treated. The average nesting female RWBL produces about four eggs in North Dakota (Stewart 1975). Using these estimates, RWBL reproduction would be reduced by about 11,600 fledglings, if all eggs laid fledged young, over 4 years or approximately 2,900 fledglings per year. Treating a maximum of 6,000 acres as analyzed in the original EA using the same RWBL inputs as describe above, WS' CMP could affect 544 breeding pairs of RWBL which could limit production by about 8,700 fledglings over 4 years or approximately 2,175 fledglings per year. With an estimated 27 million RWBL breeding in the PPR and an estimated 39 million migrating through the region annually (Peer et al. 2003), the CMP could reduce the potential RWBL populations by about 0.01% of the existing breeding population annually or 0.007% of the estimated fall population.

RWBL, however, will also nest in Conservation Reserve Program (CRP) (*i.e.*, grassland) habitat and other upland habitats where available. Nelms et al. (1994) found that only 50% of the breeding RWBL males were found in wetlands. The other 50% were found in CRP, brush habitat, alfalfa, and other upland habitat types. Displaced RWBL breeding pairs could potentially find nesting habitat in these habitat types despite the loss of cattail habitat through the CMP, thus lessening any adverse effect from the CMP on the RWBL population. Therefore, an increase of 2,000 treated acres annually will have minimal affects on RWBL populations given the minor affects to RWBL populations annually and the availability of other nesting habitat.

A similar scenario is applicable to the effects of the CMP on YHBL populations. However, YHBL nest primarily in cattails in water with depths greater than 6 inches. Given the stricter nesting requirements of YHBL, the reduction of cattails in wetlands containing water has a greater potential to affect YHBL populations than RWBL populations. An estimated 12 million YHBL breed in the PPR while 16 million YHBL migrate through the PPR annually (Peer et al. 2003). Breeding YHBL surveys conducted in May 2004 estimated 24 males/mi^2 (R. Wimberly, USDA/APHIS/ WS, unpubl. Data) and the average nesting YHBL female produces four eggs annually in North Dakota (Steward 1975). Using the maximum of 50 mi^2 of potential cattail habitat fragmented over 4 years with, one female YHBL per male about 4,800 fledglings may not be produced over 4 years or about 1,200 fledglings per year. This could reduce the YHBL population by about 0.01% of the breeding population or 0.0075% of the existing YHBL migrating population. In comparison, treating a maximum of 6,000 cattail acres, with the same YHBL inputs, could result in a loss of 3,600 fledglings over 4 years or about 900 fledglings per year. Given these estimates, the effects of WS' CMP on YHBL populations due to potential habitat fragmentation would be minimal despite the stricter nesting requirements of the YHBL.

The reduction of emergent cattail vegetation by private landowners also minimally affects breeding blackbird populations. The practices for removing cattails are burning, discing, and mowing when conditions exist to allow for these activities. These practices commonly occur in the fall after nesting has been completed when conditions are drier or when the ground is frozen. Removal of cattails by burning, discing, and/or mowing removes the erect portion of the cattail but often does not control the rhizomal root system. Therefore, with no control of the root system, growth of cattails will generally occur the following spring.

Issue 2: Potential Effects of Fragmentation of Cattail Habitat on Non-target Wetland Wildlife Species

The Reregistration Eligibility Decision (RED) for glyphosate published by the EPA (1993) concluded glyphosate has minimal effects on birds, mammals, fish, amphibians and invertebrates. Glyphosate's mode of action inhibits protein synthesis in plants by blocking the shikimic acid pathway (Cole 1985), a metabolic pathway not present in animals (Franz et al. 1997). Based on the EPA's conclusions published in the RED (EPA 1993) , the effects of glyphosate and associated adjuvants used for WS' CMP has minimal effects on wildlife. Since the risks from glyphosate exposure to wildlife are minimal, the only potential risk to wildlife populations from WS' CMP is the fragmentation of cattail habitat. The following discussion focuses on the effects of cattail fragmentation and cattail reduction on wildlife species resulting from WS' CMP.

Population estimates for most wildlife species found in North Dakota and South Dakota are not available prior to the hybridization of the native and exotic cattail. The effect the formation of hybridized, monotypic stands of cattails had on wildlife populations is unknown. Some species probably benefited while others were probably negatively affected. Treating hybridized cattails in monotypic stands returns wetlands to a mosaic pattern of emergent vegetation and open water that was typical of wetlands prior to the hybridization of the two cattail species (Kantrud 1992).

Cattail-dominated wetlands are generally marginal as fish habitat due to their high salinity and shallow basins; these shallow basins are prone to summer- and winterkill and have closed drainage basins that limit fish dispersal (Peterka 1989). Most wetland depths containing monotypic stands of cattails in North Dakota and South Dakota are less than 3 feet deep, which is the minimum depth needed to support most fish species (Peterka 1989). If water depth and salinity are sufficient, the fathead minnow (*Pimephales promelas)* and the brook stickleback (*Culaea inconstans)* are two species that can survive in North Dakota and South Dakota wetlands (Peterka 1989). These two species tolerate the shallow water depths and low concentrations of dissolved oxygen found in wetlands less than 16 feet deep. Surveys conducted in Manitoba and Nebraska estimate about 10-20% of wetlands are capable of supporting these two fish species (Peterka 1989).

The toxicity of glyphosate to fish is minimal (EPA 1993). However, the fragmentation of cattails removes overhead structure possibly making prey fish more vulnerable to predation. The fragmentation would not likely negatively affect fish populations as untreated cattail acreage remains in each wetland which can be used as escape cover[9]. Issues relating to the affects of decaying cattails on eutrophication in wetlands from WS' CMP and the potential affects on fish are discussed in Issue 3.

[9] WS' CPM removes an estimated 70% of the cattail acres in treated wetlands. This reduction constitutes less than 6% of the cattail acreage in North Dakota and South Dakota under the proposed Amendment compared to 4.4% reduction in cattails under the current program.

The herpetofauna correlated with wetlands in North Dakota and South Dakota includes eight species of amphibians and three species of reptiles (Kantrud et al. 1989). These include the tiger salamander (*Ambystoma tigrinum*), American toad (*Bufo americanus*), Great Plains toad (*B. cognatus*), Dakota toad (*B. hemiophrys*), Rocky Mountain toad (*B. woodhousei*), chorus frog (*Pseudacris nigrita*), leopard frog (*Rena pipiens*), wood frog (*R. sylvatica*), painted turtle (*Chrysemys picta*), plains garter snake (*Thamnophis radix*), and red-sided garter snake (*T. sirtalis*).

The effects of glyphosate exposure to reptiles are not well documented. However, glyphosate inhibits protein synthesis by blocking the shikimic acid pathway (Cole 1985, Alibhai and Stallings 2001), a metabolic pathway not present in mammals, birds, fish, reptiles, and insects (Franz et al. 1997, Alibhai and Stallings 2001). Available research analyzes the use of glyphosate to manipulate habitat for the benefit of reptiles. Current studies indicate glyphosate as being a cost-effective and efficient method for altering habitat to increase rare reptiles in areas where habitat has been diminishing or completely lost primarily through the control of woody vegetation growth (Johnson and Leopold 1998, Lautenschlager and Sullivan 2002). In the available documentation there is no mention of any perceived or direct evidence of mortality or negative effects to reptiles from exposure to glyphosate. Given the nontoxic effects of glyphosate to mammals, birds, fish and amphibians and the unlikely exposure risk from application of glyphosate to dense cattails, the effect of glyphosate to reptiles is also expected to be nontoxic. The loss of overhead structure and cover through cattail spraying is also expected to be minimal since cattail structure is still present in each wetland for shelter, shade, isolation, and as cover for prey species.

There are concerns that glyphosate and associated adjuvants negatively affect amphibians. However, toxicity reports show that amphibians are not more sensitive to glyphosate than fish (Mayer and Ellersieck 1986, Birge et al. 2000). A risk assessment based on exposure of amphibians and tadpoles to normal applications of glyphosate concluded glyphosate did not cause unreasonable adverse effects (Giesy et al. 2000). Studies have reported mutations and mortality to amphibians and tadpoles due to the application of terrestrial glyphosate herbicide commonly used under the tradename of Roundup® (Mann and Bidwell 1999, Howe et al. 2004, Relyea 2005). Roundup® is formulated with a surfactant called POEA (polyoxyethylene-alkylamine) and the toxicity of Roundup® to aquatic organisms' results from the surfactant POEA not from glyphosate (Folmar et al. 1979, EPA 1993, Mann and Bidwell 1999, Howe et al. 2004). Therefore, Roundup® is restricted from use near water under label guidelines. WS' CMP does not use glyphostae with POEA but rather a 90% non-ionic surfactant to facilitate absorption of glyphosate by cattails that is registered and labeled for aquatic use.

In addition, cattails are not a limiting factor in the survival of amphibians in the PPR. Cattails likely provide amphibians cover and shelter. The fragmentation of cattails does remove overhead structure that could increase predation of amphibians; however, cattail acreage still remains in any wetland treated with glyphosate[10] and the reduction of cattails through the CMP would not likely negatively affect amphibian populations.

It has been reported that wetlands are used by 17 species of mammals for shelter or to obtain food from wetland-dependant organisms (Fritzell 1989). These species include the masked shrew (*Sorex cinereus*), northern short-tailed shrew (*Blarina brevicauda*), thirteen-lined ground squirrel (*Spermophilus tridecemlineatus*), Franklin's ground squirrel (*Spermophilus franklinii*), beaver (*Castor canadensis*), western harvest mouse (*Reithrodontomys megalotis*), deer mouse (*Peromyscus maniculatus*), meadow vole (*Microtus pennsylvanicus*), muskrat (*Ondatra zibethicus*), meadow jumping mouse (*Zapus hudsonius*), red fox (*Vulpes vulpes*), raccoon (*Procyon lotor*), long-tailed weasel (*Mustela frenata*), least weasel (*Mustela nivalis*), mink (*Mustela vison*), striped skunk (*Mephitis mephitis*), and white-tailed deer (*Odocoileus virginianus*).

Most of these mammals occupy a broad niche and are commonly found in other habitats besides wetlands (Fritzell 1989). Cattails provide shelter and cover for mammals and often for other wetland dependant organisms that mammals prey upon. However, cattails do not provide the primary breeding habitat nor are cattails a primary food source for these mammals, except for muskrats. The presence of untreated cattails in wetlands would be available for muskrats to feed and to construct shelter from. At the maximum treatment of 6,000 cattail acres, WS' CMP affects less than 4.4% of the total cattail acreage in North Dakota and South Dakota if cattail regrowth to pre-treatment levels does not occur until 4 years post-treatment. Under the proposed amendment, up to 8,000 cattail acres could be treated which could affect up to 6% of the cattail habitat over 4 years if cattail regrowth does not reach pretreatment levels. With regrowth of cattails in treated wetlands likely to occur between 2 and 4 years post-treatment, along with the availability of other habitats, the affects on mammal populations' associated with CMP treated wetlands under either treatment scenario would be minimal.

The PPR of North America accounts for nearly 50% of the waterfowl production in an average year with greater production occurring when water levels are higher (Smith et al. 1964). Wetlands also play an important role during fall and spring migration as resting and staging areas for some waterfowl (Kantrud 1986). Kantrud et al. (1989) reported there are 15 waterfowl species that nest in North Dakota and South Dakota. These species include the Canada goose (*Branta canadensis*), wood duck (*Aix sponsa*), green-winged teal (*Anas carolinensis)*, mallard (*A. platyrhynchos)*, northern pintail (*A. acuta)*, blue-winged teal (*A. discors)*, northern shoveler (*A. clypeata)*, gadwall (*Mareca (Anas) strepera)*, American wigeon (*M. (A.) americana)*, canvasback (*Aythya valisineria)*, redhead (*A. americana)*, ring-necked duck (*A. collaris)*, lesser scaup (*A. affinis*), hooded merganser (*Lophodytes cucullatus)*, and ruddy duck (*Oxyura jamaicensis)*. Dense, homogenous stands of cattails in wetlands are unfavorable for waterfowl use (Kantrud et al. 1989). Cattail stem densities in these monotypic stands are so high that the cattails act as a barrier preventing access to the water surface and movement. Waterfowl generally favor wetlands with a mosaic of open water and cattail stands more than wetlands with

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[10] WS' CPM removes an estimated 70% of the cattail acres in treated wetlands. This reduction constitutes less than 6% of the cattails in North Dakota and South Dakota under the proposed Amendment compared to 4.4% reduction in cattails under the current program.

monotypic stands of cattails (Solberg and Higgins 1993, Linz et al. 1996). Mallards, blue-winged teal, northern shovelers, gadwall, and northern pintails were negatively correlated with the percent of live vegetation in wetlands (Linz et al. 1996).

The primary food source for many waterfowl species is aquatic invertebrates. Invertebrates comprise a large portion of adult and juvenile waterfowl diets during the breeding season, ranging from 70% to 99% of their diet by volume, and dabbling duck pair densities have been positively correlated with invertebrate populations (Murkin et al. 1982). Populations of invertebrates have been shown to increase in wetlands where cattail stem densities were decreased possibly due to an increase in available nutrients from decomposing vegetation (McKnight and Low 1969, Whitman 1976).

Review of the current literature indicates the CMP has a beneficial effect on waterfowl populations by removing obstructive vegetation and providing foraging opportunities by increasing invertebrate populations in wetlands. However, the CMP results in less overhead structure that provides conspecific pair isolation during the breeding season (Murkin et al. 1982) and brood concealment (Stoudt 1971). The CMP treats 70% of the cattail acreage in each wetland in a striping pattern leaving overhead structure that could still be used for concealment and isolation.

Many other bird species utilize wetlands throughout the year with a total of 138 species using wetlands in North Dakota and South Dakota (Kantrud et al. 1989). Of those 138 bird species, 56 non-waterfowl species are closely associated with aquatic habitats (Kantrud et al. 1989). Of those 56 non-waterfowl species, 15 are not closely associated with nesting in wetlands that are primarily treated in the CMP but can be seen loafing or foraging in or around wetlands during the breeding season and during migration. These 15 non-waterfowl species include the common loon (*Gavia immer*), red-necked grebe (*Podiceps grisegena*), osprey (*Pandion haliaetus*), bald eagle (*Haliaeetus leucocephalus*), yellow rail (*Coturnicops noveboracensis*), common snipe (*Gallinago gallinago*), American woodcock (*Scolopax minor*), ring-billed gull (*Larus delawarensis*), California gull (*L. californicus*), Caspian tern (*Sterna caspia*), common tern (*S. hirundo*), least tern (*S. antillarum*), belted kingfisher (*Ceryle alcyon*), willow flycatcher (*Empidonax traillii*), and swamp sparrow (*Melospiza georgiana*) (Kantrud et al. 1989). The CMP is not likely to negatively affect populations of these species since neither cattail nor shallow-basin wetlands are the primary foraging, breeding, or loafing sites for these species.

The remaining 82 bird species are not closely associated with aquatic habitats yet they may use wetlands for roosting, loafing, and foraging during the breeding season and migration. Though the presence of cattails does play a role in attracting these birds to wetlands, cattails are not a limiting factor in the sustainability of those 82 bird species' populations. The effects of the CMP on those 82 bird species would be minimal at the 6,000 (*i.e.*, less than 4.4%) and 8,000 (*i.e.*, less than 6%) acre treatment rate given the small cumulative effects of the CMP on the total cattail acreage and the regenerative characteristics of cattails.

The potential effects to bird populations from the CMP would be to those species that use cattails as nesting material or as structure to attach nests. Of the 56 non-waterfowl bird species that use wetlands, eight are considered rare to uncommon. The eight species that are likely to nest, have nested, or are inferred to nest in PPR wetlands include the least bittern (*Ixobrychus exilis)*, little blue heron (*Egretta caerulea)*, tricolored heron (*E. tricolor)*, cattle egret (*Bubulcus ibis)*, green-backed heron (*Butorides striatus)*, king rail (*Rallus elegans)*, sandhill crane (*Grus canadensis)*, and white-faced ibis (*Plegadis chihi)* (Kantrud et al. 1989). Of these species, the least bittern, king rail, and white-faced ibis use emergent vegetation for nesting or as nesting structure and the CPM could potentially reduce some nesting sites. However, as stated earlier, the CMP has minimal annual adverse affects on the total cattail acreage in North Dakota and South Dakota.

The least bittern has been classified as an uncommon migrant and summer resident in eastern South Dakota and rare in North Dakota (Stewart 1975, South Dakota Ornithological Union 1991). Least bitterns are found primarily in freshwater wetlands with dense stands of emergent vegetation (Gibbs et al. 1992a). However, the least bittern has not been recorded on Breeding Bird Survey (BBS) routes in North Dakota or South Dakota (Sauer et al. 2005). The absence of least bitterns from BBS records in North Dakota and South Dakota does not preclude their presence in either state. The survey methods of the BBS are not conducive to censusing secretive wetland species, making bittern population trend data contradictory and unclear (Gibbs et al. 1992a). Population data for least bitterns across BBS routes shows a general declining trend from 1980-2004 (Sauer et al. 2005). The least bittern was listed as a Blue List species by the National Audubon Society (Tate 1986) but was later removed under a more subjective analysis under the Audobon's WatchList 2002 project. WS' CMP could remove potential least bittern nesting and foraging habitat in some wetlands but would not likely negatively affect populations occurring in North Dakota and South Dakota given the small percentage of cattails fragmented by the CMP at either cattail treatment rate (*i.e.*, 4.4% at 6,000 acres maximum vs. 6% at 8,000 acres maximum) and the availability of other suitable nesting and foraging sites.

King rail distribution in North Dakota and South Dakota is limited to the extreme eastern parts of each State (Poole et al. 2005). In South Dakota, the king rail has been classified as a rare summer resident in the east (South Dakota Ornithological Union 1991) and only a hypothetical resident in North Dakota (Stewart 1975). Freshwater wetlands containing cattails are the primary breeding habitat of the king rail in the northern portion of their range (Poole et al. 2005). King rails are another secretive wetlands species that is not well suited to censusing by the BBS. In their northern range, king rails are showing a declining population trend but show a relatively stable trend in their southern range with the draining of wetlands the greatest factor contributing to population declines (Poole et al. 2005). WS' CMP is likely having minimal effects on king rail populations in North Dakota and South Dakota due, in part, to the limited distribution of king rails in these two states, the availability of nesting and foraging sites, and the small percentage of cattails treated by WS at either the 6,000 acre maximum (4.4% of total cattail acres) or the 8,000 acre maximum (6% of total cattail acres) rates.

The white-faced ibis is considered a rare to uncommon visitor and breeds locally in eastern South Dakota (South Dakota Ornithological Union 1991) with a few records of nesting in North Dakota (Schmidt 1980). The primary breeding range of the white-faced ibis is the coastal regions of the Gulf of Mexico and southern California (Ryder and Manry 1994). Inland nesting habitats constitute freshwater wetlands containing islands of emergent vegetation with preference for nesting in bulrush (*Scirpus* spp.) (Ryder and Manry 1994). The populations and breeding range of the white-faced ibis has expanded in the last two decades with local breeding populations in the west fluctuating based on habitat conditions (Ryder and Manry 1994). WS' CMP would not likely negatively affect white-faced ibis populations and may slightly benefit local populations given their preference to nest in open marshes with patches of emergent vegetation.

There are 33 non-waterfowl species considered common or abundant in North Dakota and South Dakota. The non-waterfowl bird species that are closely associated with aquatic environments but do not require cattails for nesting include the American white pelican (*Pelecanus erythrorhynchos*), double-crested cormorant (*Phalacrocorax auritus*), great blue heron (*Ardea herodias*), Franklin's gull (*Larus pipixcan*), piping plover (*Charadrius melodus*), killdeer (*C. vociferous*), marbled godwit (*Limosa fedoa*), willet (*Catoptrophorus semipalmatus*), spotted sandpiper (*Actitis macularia*), Forster's tern (*Sterna forsteri*), COGR, Le Conte's sparrow (*Ammodramus leconteii*), song sparrow (*Melospiza melodia*), and savannah sparrow (*Passerculus sandwichensis*). The fragmentation of cattails in wetlands from the CMP would not likely negatively affect these species at either the 6,000 acre maximum or the 8,000 acre maximum rates.

The remaining 19 species either use cattails as nesting materials or utilize cattails as structure to attach nests. This group includes the horned grebe (*Podiceps auritus*), eared grebe (*P. nigricollis*), western grebe (*Aechmophorus occidentalis*), pied-billed grebe (*Podilymbus podiceps*), American bittern (*Botaurus lentiginosus*), black-crowned night heron (*Nycticorax nycticorax*), northern harrier (*Circus cyaneus*), Virginia rail (*Rallus limicola*), sora (*Porzana carolina*), American coot (*Fulica americana*), American avocet (*Recurvirostra americana*), Wilson's phalarope (*Phalaropus tricolor*), black tern (*Chlidonias niger*), marsh wren (*Cistothorus palustris*), common yellowthroat (*Geothlypis trichas*), RWBL[11], YHBL, sedge wren (*Cistothorus platensis*), and sharp-tailed sparrow (*Ammodramus cauducutus*). These species will be discussed further in the following paragraphs.

As stated previously, the four species of grebes found in the PPR are the horned grebe, eared grebe, western grebe, and pied-billed grebe. These grebe species are common in North Dakota and South Dakota where suitable habitat exists (Stewart 1975, South Dakota Ornithological Union 1991). Grebes have similar nesting habitat requirements but preference for ratio of open water to emergent vegetation various by species. Horned grebes and western grebes prefer wetlands with beds of emergent vegetation with substantial areas of open water (Storer and Nuechterlein 1992, Stedman 2000). In a Minnesota study, eared grebes nested in wetlands with 42%-100% open water (Boe 1992). Pied-billed grebes nest in wetlands with dense emergent vegetation near open water (Muller and Storer 1999). All four species use vegetative mats as nesting platforms which are often constructed with emergent vegetation. Generally, the four

[11] Effects to RWBL and YHBL are discussed in Issue 1 of this document.

grebe species are showing declining population trends from 1980-2004 in South Dakota except pied-billed grebes (Sauer et al. 2005). In North Dakota, all four species are showing increasing population trends from 1980-2004 (Sauer et al. 2005). The fragmentation of monotypic stands of cattails likely benefits grebes by creating more desired habitat through the creation of open water intermixed with flooded emergent vegetation. Decaying cattails post-treatment may also serve as vegetative mats used as nesting platforms by grebes. The 20 foot wide strips of cattails remaining after the CMP treats 70% of the cattail acreage also serve as protection from wind and wave action which can destroy nests. Given the nesting habitat preferences of grebes, the CMP is not likely to negatively affect grebe populations.

The two species of Ardeidae found in North Dakota and South Dakota are the American bittern and black-crowned night heron. Both species are considered common to locally common in both states (Stewart 1975, South Dakota Ornithological Union 1991). The American bittern nests primarily in wetlands with dense stands of emergent vegetation (Gibbs et al. 1992b) while black-crowned night herons prefer wetlands with equal parts open water and emergent vegetation (Davis 1993). The American bittern has shown a stable BBS population trend in South Dakota and an increasing population trend in North Dakota from 1980-2004 (Sauer et al. 2005). The black-crowned night heron in South Dakota has shown a declining BBS population trend and an increasing population trend in North Dakota from 1980-2004 (Sauer et al. 2005). The black-crowned night heron is likely to benefit from WS' CMP through cattail habitat fragmentation in monotypic stands of cattails to a preferred mosaic of open water and emergent vegetation. The nesting habitat requirements for American bitterns are not as well defined when compared to other wetland species. The amount of open water preferred, if any, is unknown. If American bitterns prefer wetlands with dense emergent vegetation and little to no open water, the CMP could remove some potential breeding habitat. However, for the following reasons, the effects of the CMP on American bittern breeding populations are minimal. The strips of cattails remaining after treatment would be available for bitterns to occupy and would be dense enough to provide nesting habitat. The CMP affects less than 4.4% at the 6,000 acre maximum treatment rate and less than 6% at the 8,000 acre maximum treatment rate of the cattail acreage and an even smaller percent of the total wetlands in the PPR. The propensity of cattails to regrow in treated wetlands means the potential exists for the renewal of monotypic stands of cattails less than 4 years post-treatment. And as stated earlier, BBS data shows steady to increasing population trends in breeding American bittern populations in South Dakota and North Dakota, respectively, indicating favorable habitat conditions currently exist.

The northern harrier is the only member of Accipitridae that uses wetlands for nesting and is a common summer resident in North Dakota and South Dakota (Stewart 1975, South Dakota Ornithological Union 1991). Nesting occurs in a broad range of habitats associated with wetlands, but preference is given to dense stands of vegetation, either on dry land or on platforms above the water (MacWhirter and Bildstein 1996). In a national survey, 18% of the 428 northern harrier nests were found in tall stands of grasses, reeds (*Phragmites*), and cattails (Apfelbaum and Seelbach 1983). Northern harrier populations in South Dakota are showing a declining population trend while populations in North Dakota are showing an increasing trend according to the BBS (Sauer et al. 2005). The CMP has not negatively affected northern harrier populations given their broad nesting habitat preference since nesting is not restricted to cattails.

Three species of Rallidae are common nesters in North Dakota and South Dakota; these include the Virginia rail, sora, and American coot. Breeding habitat for these species is similar, as they all prefer freshwater habitats but the degree of emergent vegetation preferred varies, especially to the presence of cattails. Virginia rails prefer cattail habitats that are drier than habitats preferred by soras (Conway 1995). Coots prefer flooded areas of emergent vegetation, mainly cattails, along the edges of wetlands (Brisbin et al. 2002). BBS data for America coots indicate a steady increasing population trend in South Dakota and North Dakota (Sauer et al. 2005). Sora population trends indicate an increasing population in both states while Virginia rails are showing an increasing trend in North Dakota with no BBS data available for South Dakota (Sauer et al. 2005). Local coot populations can be positively affected by fragmentation of wetlands choked by cattails with densities increasing in wetlands following treatment of monotypic stands of cattails (Linz et al. 1997). Coot abundance was negatively correlated with the percent of live vegetation in wetlands and positively correlated with the amount of open water and dead vegetation (Linz et al. 1997). WS' CMP is likely to positively influence coot abundance by creating preferred habitat in treated wetlands and are not adversely affected by CMP activities. Sora densities were reduced in wetlands where dense stands of cattails were fragmented (Linz et al. 1997). However, sora densities did not differ among untreated wetlands and treated wetlands 2 years post-treatment (Linz et al. 1997), perhaps due to cattail regrowth in treated areas. Given the similar habitat requirements of Virginia rails and soras, rail densities in treated wetlands are also likely to be temporarily reduced on a local-level 1 year post-treatment but would be expected to increase in treated wetlands during subsequent years as cattail regrowth occurs. Virginia rail and sora densities on a local-level may temporarily be reduced by WS' CMP at either the 6,000 acre maximum or the 8,000 acre maximum treatment rates, however observations indicate densities would recover as regrowth of cattails occurs in treated areas. Densities of these two species across their range in North Dakota and South Dakota are not adversely affected given the small proportion of cattails in wetlands fragmented under WS' CMP.

The American avocet and Wilson's phalarope are two species closely associated with wetland habitats and both are common in North Dakota and South Dakota where wetland habitats exist. American avocets are found in a variety of wetland habitats but prefer wetlands with some emergent vegetation though they spend most of their time near open-water (Robinson et al. 1997). They prefer to nest on islands, when available, with nests generally being elevated to allow for an unobstructed view (Robinson et al. 1997). Wilson's phalaropes prefer wetlands with a large portion of open water with nesting occurring in sparse to dense stands of upland and wetland vegetation typically with 350 feet of wetland edges (Colwell and Jehl 1994). WS' CMP is not negatively affecting either species given their nesting preferences and may slightly benefit both species by creating more open water that both species use for foraging.

Black terns are a common summer resident in North Dakota and South Dakota. Continental black tern populations are showing population declines (Dunn and Agro 1995). However, BBS data indicate populations in South Dakota and North Dakota have been stable and increasing from 1980-2004, respectively (Sauer et al. 2005). Black terns are semicolonial waterbirds nesting on dead vegetation mats or on platforms with preference for freshwater wetlands with emergent vegetation covering 25%-75% of the surface area (Dunn and Agro 1995). Black terns showed a positive correlation with the percent of open water and the percentage of dead vegetation in cattail-dominated wetlands fragmented using an aquatic glyphosate herbicide (Linz and Blixt 1997). In addition, black tern densities increased in treated wetlands due to an increase in open water and dead vegetation that can be used for nesting (Linz et al. 1994). Overall, black terns likely benefit from cattail management through the fragmentation of cattails that creates a mosaic of open water and live vegetation with the dead cattails serving as substrate for nesting.

The marsh wren, sedge wren, common yellowthroat, and sharp-tailed sparrow all share similar breeding habitat requirements. All four species nest in habitats ranging from upland vegetation near wetlands to emergent wetland vegetation. From 1980-2004 in North Dakota, both species of wrens and the sharp-tailed sparrow showed increasing BBS population trends, while yellowthroats showed a stable trend (Sauer et al. 2005). In South Dakota from 1980-2004, both wren species and yellowthroats showed an increasing BBS population trend with no information available on sharp-tailed sparrows (Sauer et al. 2005). The density of marsh wrens and common yellowthroats declined in cattail dominated wetlands experimentally fragmented one year post-treatment but showed an increase from year one to year two post-treatment (Blixt 1993). The other two species likely show similar reductions in densities initially with a rebound occurring as vegetation reemerges in treated areas. Given the cattail's ability to regenerate under suitable conditions and the use of a wide range of nesting habitat demonstrated by these four species, WS' CMP would not adversely affect the populations of these species given the small percentage of the total acres of cattails treated at either the 6,000 acre and 8,000 acre maximum treatment rates.

Though not a breeding habitat requirement, cattails do provide shelter in the winter for ring-necked pheasants (*Phasianus colchicus)* and white-tailed deer in North Dakota and South Dakota (Kantrud et al. 1989). The CMP may temporarily reduce some wintering habitat but remaining cattail strips, regrowth in treated areas, untreated cattails in other wetlands, and other habitats would provide adequate shelter for these species populations.

In summary, the fragmentation of cattail choked wetlands has varying effects on wildlife populations. WS' CMP likely benefits some wildlife species that require a mosaic configuration of emergent vegetation and open water. However, the removal of 70% of the total cattail acreage in each wetland could slightly but temporarily reduce densities of other wildlife species that have a high correlation to dense, live cattails. Cattail habitat fragmentation is likely temporary if water depth and environmental conditions exist for regrowth. The reduction of cattails from WS' current CMP in comparison to the total cattail acreage in North Dakota and South Dakota is currently less than 1% annually (Table 1) and cattail densities in treated wetlands typically recover 2-4 years post-treatment. With an annual potential treatment of less than 1.5% of the total cattail acreage at the 8,000 maximum treatment rate, WS will affect less than 6% of the cattail acreage in North Dakota and South Dakota provided that cattail densities return to pre-treatment levels within 4 years post-treatment.

Issue 3: Eutrophication and Biological Oxygen Demand (BOD) in Managed Wetlands

Eutrophication is the process of nutrient accumulation in water bodies primarily from nitrogen and phosphorus loading. Natural eutrophication is a successive process in water bodies that occurs gradually from drainage inputs and biological processes of organisms (*i.e.*, degradation), such as nitrogen fixation by blue-green algae and bird waste. Human influenced or cultural eutrophication also occurs from agricultural fertilizer and waste water loading in water bodies.

Wetlands are highly productive with vegetation production reported at 3,600 lb/acre dry weight annually in North Dakota and South Dakota (Neely and Baker 1989). Emergent vegetation production occurs annually if environmental conditions are suitable for growth. This production of vegetation in wetlands, especially in cattail dominated wetlands, dies and decays annually with new growth occurring from rhizomatous root systems. Thus, almost the entire emergent vegetation biomass produced annually contributes to the nutrient loading in wetlands from leaching and deterioration of vegetative matter. Neely and Baker (1989) characterized emergent vegetation as nutrient pumps that remove nutrients in the sediment through the root system and deposit nutrients into the surface water through leaching and decay of litter.

After leaching of nutrients has occurred, litter often serves as a nitrogen and phosphorous sink during breakdown by microbes (Neely and Baker 1989). This augmentation of nutrients from surface water by microbes is a significant factor in nutrient turnover in wetlands. Major factors influence the role of litter as nutrient sinks in wetlands. Neely and Davis (1985) reported these factors as the amount of nitrogen and phosphorous available from litter, the rate of deterioration and mineralization of litter, and the nutrients accumulated through microbial action. Emergent vegetation is considered the "*driving force*" for the removal of nutrients from wetlands, not through the immobilization of nutrients in living tissue but as litter in the wetland (Neely and Baker 1989). The decaying cattails resultant from the CMP would be part of the already naturally occurring litter that exists annually in cattail dominated wetlands and would not likely increase the rate of eutrophication, but in fact may slightly reduce the rate of eutrophication by temporarily reducing cattail growth post-treatment.

Communal roosting blackbirds also contribute to nutrient loading in wetlands through excreta deposition. Hayes and Caslick (1984) reported nightly excreta of nitrogen (N), phosphorus (P), and potassium (K) at 59.0, 9.0, and 8.7 mg, respectively by female RWBL. Nightly excreta by male RWBL were reported at 75.0, 12.0, and 11.0 mg for N, P, and K, respectively. Total nutrient deposition in wetlands where roosting densities of blackbirds were highest ranged up to 155, 24, and 23 lbs/acre/year of N, P, and K, respectively. In North Dakota and South Dakota, blackbird roosts consist primarily of RWBL, but YHBL and COGR also occur in mixed species flocks. Nightly excreta deposition from YHBL and COGR are unknown. Lutman (2000) documented roosts in east-central North Dakota that exceeded 50,000 blackbirds though population fluctuations in major roosts occurred throughout the survey period. Population sizes, species composition, and sex ratios of roosting/migrating blackbirds in North Dakota and South Dakota varies throughout the fall and spring making nutrient deposition from roosting blackbirds difficult to determine. Large concentrations of roosting blackbirds causes nutrient loading in wetlands that exceeds inputs from precipitation and likely similar to inputs from runoff into wetlands (Hayes and Caslick 1984). Given the quantities of excreta deposited into wetlands by blackbirds, the dispersal of roosting/migrating blackbirds from cattail-dominated wetlands through fragmentation of dense cattail habitat would lessen nutrient loading by blackbirds.

Biological Oxygen Demand (BOD) is the measure of dissolved oxygen in water used by anaerobic organisms for the breakdown of organic matter in wetlands. The use of large amounts of dissolved oxygen by anaerobic organisms may reduce the amount of dissolved oxygen available to fish, insects, and other organisms that use dissolved oxygen in wetlands. The decomposition of organic matter can also lower dissolved oxygen levels in wetlands. WS' CMP would not contribute additional vegetative litter to wetlands that would not already be present annually and may reduce the total amount of vegetative material during the 2 to 4 years it may take for cattail regrowth. Since WS' CMP actions are not additive to the already existing conditions, the BOD would not increase beyond levels that occur annually through natural processes.

Issue 4: Spread of Non-native Noxious Wetland Plants Subsequent to Treating Cattails

To help ensure adequate, longer-term (*i.e.* 2-4 years) cattail control occurs through water inundation, WS verifies, through aerial surveys conducted each July, the presence of water within wetland basins prior to spraying. The presence of water in wetlands the year cattails are treated does not ensure continued presence of water within the wetland basin on subsequent years due to fluctuations in precipitation and snow melt. However, the likelihood of water being present in treated areas increases the likelihood of longer cattail control through water inundation while decreasing the possible establishment of invasive plants that do not tolerate long periods of water inundation. Solberg and Higgins (1993) reported dead cattail stems were dominant in areas treated with glyphosate one year post-treatment while bladderwort (*Utricularia vulgaris*) dominated treated areas two years post-treatment. Bladderwort is a native plant species that is found in shallow wetlands and lakes, and tolerates water inundation.

The North Dakota Department of Agriculture and the South Dakota Department of Agriculture currently classifies three plant species with a close association with wetlands as noxious that must be controlled by county, State, and federal authorities. The three plants are purple loosestrife (*Lythrum salicaria*), saltcedar (*Tamarix chinensis, T. parviflora, T. ramosissima*), and Canada thistle (*Cirsium arvense*).

Canada thistle can be found statewide in North Dakota and South Dakota readily growing in wet areas along wetlands, road ditches, and river banks. The presence of standing water in wetlands precludes growth of Canada thistle and prevents colonization of thistle in CMP treated areas. WS' CMP targets dense stands of cattails in wetlands with standing water to maximize control of cattails through water inundation post-treatment and reduce the chances of establishment of Canada thistle.

Saltcedar has been restricted to the Missouri River system in North Dakota, while distribution in South Dakota is more widespread with infestations occurring primarily along river and stream banks. Natural seed dispersal occurs by moving water transport, allowing colonization in areas along rivers and lakes. However, wind dispersal of seed can also occur. Infestations in North Dakota are closely monitored with active searching occurring in areas where infestations are likely to occur. Local, State, and federal agencies in both states are actively managing and controlling existing saltcedar infestations. Though possible, the likelihood of saltcedar colonizing in closed basin wetlands treated by the CMP is unlikely given its limited distribution in North Dakota and South Dakota and could more easily be controlled.

Purple loosestrife in North Dakota has been confined to urban centers where seeds have dispersed from ornamental plantings primarily through the municipal storm water drains into nearby rivers and streams. Efforts to identify, manage, and limit the dispersal of loosestrife have been successful with efforts confining infestations to a few locations along rivers and streams in North Dakota (D. Hirsch, USDA\APHIS\PPQ, Bismarck, ND 2005 pers. comm.). A similar distribution pattern occurs in South Dakota. Purple loosestrife is found in a variety of aquatic habitats that include stream banks, shorelines, and wetlands. Loosestrife can be very invasive and will readily displace native vegetation, including cattails (D. Hirsch, USDA\APHIS\PPQ, Bismarck, ND 2005 pers. comm.). Currently, there have been no reports of loosestrife colonizing areas treated under the CMP. With loosestrife currently confined to a few locations surrounding urban centers that are currently being managed by local, State, and federal authorities, the likelihood of colonizing areas treated under the CMP is highly unlikely. However, WS will continue to coordinate with the state offices of USDA/APHIS/PPQ in North Dakota and South Dakota and the Department of Agriculture in both states to ensure CMP activities do not promote colonization of loosestrife or any other invasive species in wetlands and if colonization should occur, that proper management measures are implement.

Issue 5: Potential for Polluting Wetlands with Chemicals

Application of glyphosate to cattails during WS' CMP occurs at 4 pints per acre which is less than the minimum label rate for cattails. Recent studies on application rates show adequate control of cattails using the lower rate per acre (H. J. Homan, National Wildlife Research Center, Bismarck, ND, 2005 unpubl. data). Aerial applicators are also instructed to apply glyphosate only on areas of high cattail density to minimize the amount of glyphosate that reaches surface water. In addition, aerial applicators are required to thoroughly clean all mixing and holding tanks, nozzles, and hoses prior to initiation of spraying for WS to ensure other chemicals do not enter wetlands.

Glyphosate is readily soluble in water, with a solubility of 1.6 ounces per gallon of water (EPA 1993) and it readily binds with suspended soil particles in water and sediment and has a reported half-life ranging from 7.5 days to 60 days in pond water (Goldsborough and Beck 1989, EPA 1993, Goldsborough and Brown 1993). The reduced application rate, use of specialized spray equipment, instruction to spray only dense stand of cattails, and the infrequency of glyphosate application minimizes the accumulation of glyphosate in wetlands.

Issue 6: Potential Effects of WS' Blackbird Damage Management Program on Human Health and Safety and Nontarget Wildlife

The current program integrates several blackbird damage abatement techniques (*i.e.*, loaning of frightening devices, technical assistance and the CMP) to reduce agricultural damage caused by blackbirds. Frightening devices include, but are not limited to, pyrotechnics, propane cannons, and electronic harassment equipment. Interested producers are instructed in the proper use of all frightening devices loaned or distributed to help ensure the safety of the user and public. Frightening devices utilize sound either through simulation of a firearm discharge or through mimicking distress calls of the damaging species with no birds or other wildlife intentionally killed. These audible noises act to disperse birds from fields through negative association and only serve to disperse birds from protected fields. During periods of high crop damage, other food sources and shelter are available, minimizing the effects of dispersal on blackbirds and non-target wildlife[12]. With other food sources and shelter available, the effects of frightening devices to blackbirds and to non-target wildlife are minimal; human health and safety effects are also minimal. Cooperators using frightening devices provided by WS, primarily propane cannons and pyrotechnics, are also advised to limit use to times of high bird activity and to discontinue use after sunset to minimize habituation and minimize potential disturbances to surrounding residents through disruption of nighttime activities or sleep.

After a request from a landowner and/or lessee, with permission granted by the landowner, aquatic glyphosate is applied to cattails in wetlands using a helicopter if requirements are met and funding permits. Potential direct exposure to glyphosate is limited to the aerial applicator and employees during the mixing and loading phase. Exposure to humans through drift is highly unlikely given the strict application guidelines imposed by WS, the use of application equipment by aerial applicators, such as microfoil booms and AccuFlow nozzles, which greatly reduce drift potential, and the relative remoteness of most treated wetlands.

Though unlikely, if direct or indirect human exposure to glyphosate occurs, the effects on human health and safety would not pose serious health risks. The EPA classifies glyphosate as a Category E carcinogen, meaning sufficient evidence exists to determine glyphosate is not carcinogenic in humans (EPA 1993). Williams et al. (2000) published a comprehensive review and risk assessment of human exposure to glyphosate. The published report stated glyphosate has a very low acute toxicity in humans and serious side effects occurred only after intentional ingestion of large amounts of glyphosate. Bioaccumulation does not occur in humans as glyphosate is not stored in the body due to poor absorption and rapid excretion. Williams et al. (2000) also reported glyphosate does not: 1) negatively affect reproduction or development, 2) disrupt endocrine function, or 3) put children at greater risk. The review and risk assessment

[12] The effects of WS' CMP on non-target wildlife were discussed in Issue 2 of this document.

concluded that the use of glyphosate under current label guidelines and expected use conditions would not pose a health risk to humans.

Human exposure to glyphosate has been documented in California through a pesticide illness reporting program. Though glyphosate has been implicated in human exposure reports in California, the California EPA (1996) stated interpretation of those results should consider the number of people exposed and the types of reported effects. Of all the reported glyphosate exposure cases, 80% involved temporary skin irritations. No cases of hospitalization were reported from glyphosate exposure out of 515 cases of pesticide exposure. Goldstein et al. (2002) reported that from 1982-1997, 815 cases of pesticide exposure were reported in California. Of those 815 reported cases, 22 were classified as possibly related to glyphosate exposure and of those 22 cases, none were consistent with symptoms of glyphosate exposure.

A formal risk assessment of WS' operational management methods found that risks to human health and safety and the environment were low (USDA 1997, Appendix P). Based on this Risk Assessment, APHIS concluded the use of glyphosate in WS' CMP, when used in accordance with label directions, was highly selective and such use has negligible effects on human health and safety and the environment (USDA 1997). In addition, EPA has rigorous requirements for the registration of chemicals to ensure that the effects on human health and safety and the environment are low.

Issue 7: Potential Effects of WS' Blackbird Damage Program on Threatened and Endangered Species

The Reregistration Eligibility Decision published by the EPA (1993) on glyphosate concluded technical glyphosate has minimal effects on birds, mammals, fish, and invertebrates including Threatened and Endangered (T&E) species. The U. S. Fish and Wildlife Service (USFWS), Ecological Services, Bismarck, North Dakota issued a letter of concurrence in 1993 stating that WS' proposed action would not likely adversely affect any T&E species in North Dakota and South Dakota (Sapa 1993). The USFWS issued an additional letter of concurrence in 2002 stating an increase in WS' CMP activities from 6,000 treated acres to a maximum of 8,000 treated acres would not likely adversely affect any T&E species in either state (Sapa 2002). The USFWS, in both letters of concurrence, agreed with the selection of an integrated pest management approach which allows for greater flexibility for reducing blackbird damage to sunflower.

Issue 8: Potential Effects of Treating Cattails with Glyphosate on Non-Target Plants

Glyphosate is a broad spectrum, systemic herbicide used to reduce emerged plants. As a broad spectrum herbicide, glyphosate has the potential to effect non-target plants through direct application and/or by drift. To mitigate any potential effect to non-target plants, aerial applicators are instructed to spray only areas of dense cattails, especially along wetland edges, in winds less than 8 mph to minimize drift. Currently, applicators apply glyphosate using a helicopter and microfoil booms with Accuflow nozzles. Microfoil booms allow the applicator to control droplet size that limits drift potential in different wind speeds. Accuflow nozzles accurately adjust spray volumes based on the air speed of the helicopter to ensure uniform application. Hazards to non-target plants is minimal given the wind speed restrictions place on the aerial applicators, applications only occurring to dense, continuous cattail acreages, and the drift reducing booms and nozzles used during application.

Issue 9: Glyphosate in the Environment Causes Genetic Damage to Amphibians and Alters Communities of Subsoil Fungal Organisms

On contact with surface water, glyphosate dissipates rapidly by: 1) adhering to suspended soil particles and sediment, 2) by microbial degradation, and 3) photolysis (Bronstad and Friestad 1985). Glyphosate is stable to hydrolysis and photodegradation (EPA 1993), however, microorganisms in soils readily metabolize it into AMPA which is further degraded to CO_2 (EPA 1993); glyphosate has a reported half-life ranging from 7.5 days to 60 days in pond water (Goldsborough and Beck 1989, EPA 1993, Goldsborough and Brown 1993).

As discussed previously (Issue 2), glyphosate exposure does not cause adverse effects to amphibians or tadpoles (Giesy et al. 2000). Several studies reporting amphibian mutations and mortality occurred under the evaluation of a terrestrial[13] glyphosate-based herbicide under the trade name of Roundup® (Mann and Bidwell 1999, Howe et al. 2004, Relyea 2005). A surfactant called POEA is formulated as an ingredient in Roundup® and the toxicity to aquatic organisms results from the surfactant POEA, not from glyphosate (Folmar 1979, EPA 1993, Mann and Bidwell 1999, Howe et al. 2004). The aquatic glyphosate formulation, used in WS' CMP, is technical glyphosate that does not contain the surfactant POEA. WS' CMP uses a 90% non-ionic surfactant to facilitate absorption of glyphosate by cattails that is labeled for aquatic use. WS' use of glyphosate is not having adverse effects on amphibians or tadpoles.

Glyphosate inhibits the production of an enzyme in the shikimic acid pathway that is present in plants, bacteria, and fungi. Some microorganisms have shown tolerance toward glyphosate while some exhibit sensitivity (CaJacob et al. 2004). Under WS' CMP, cattails are treated using a single glyphosate application. Cattail regrowth will begin to occur gradually 2-4 years post-treatment depending on the water depth in treated areas. However, pre-treatment cattail densities are unlikely to occur for up to 4 years post-treatment. Therefore, if reapplication occurs, it generally occurs at least 4 years after the initial treatment. Any initial effects on fungal communities following application to fragment cattails in wetlands would likely be temporary and fungal communities in the subsoil of wetlands would not be adversely altered long-term.

Issue 10: The Surfactant POEA is Three Times as Toxic as Glyphosate and Could Impact Wetland Insect Populations

The surfactant POEA, found in the terrestrial herbicide Roundup®, is not an ingredient in the aquatic formulation of glyphosate used in WS' CMP and glyphosate, as used by the WS' CPM,

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[13] Roundup® is restricted from use near water under label restrictions.

is non-toxic to terrestrial and aquatic invertebrates (EPA 1993). There is no data to suggest that WS' CMP is adversely affecting wetland invertebrate populations.

Issue 11: Environmental Justice and Executive Order 12898 - *"Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations"*

The Executive Order (EO) promotes the fair treatment of people of all races, income levels and cultures with respect to the development, implementation and enforcement of environmental laws, regulations and policies. Environmental Justice (EJ), also known as Environmental Equity, has been defined as the pursuit of equal justice and equal protection under the law for all environmental statutes and regulations without discrimination based on race, ethnicity, or socioeconomic status.

EJ is a priority both within APHIS and WS. EO 12898 requires federal agencies to make EJ part of their mission, and to identify and address disproportionately high and adverse human health and environmental effects of federal programs, policies and activities on minority and low-income persons or populations.

All WS activities are evaluated for their impact on the human environment and compliance with EO 12898 to insure EJ. WS personnel use damage management methods as selectively and environmentally conscientiously as possible, responding to all requests for assistance equally and effectively. No aspect of the blackbird damage management program in North Dakota or South Dakota would disproportionately adversely affect any people or communities.

Issue 12: Protection of Children from Environmental Health and Safety Risks (EO 13045)

Children may suffer disproportionately from environmental health and safety risks for many reasons. Blackbird damage management for the protection of crops as proposed in this amendment would only involve legally available and approved damage management methods in situations or under circumstances where it is highly unlikely that children would be adversely affected. Therefore, implementation of the proposed action or other alternatives involving direct assistance by WS would not increase environmental health or safety risks to children.

Issue 13: Effects of WS Bird Damage Management Methods on Aesthetic Values

The human attraction to animals has been well documented throughout history and started when humans began domesticating animals. The American public is no exception and today a large percentage of households have pets. However, some people may consider individual wild animals and birds as "pets" or exhibit affection toward these animals, especially people who enjoy coming in contact with wildlife. Therefore, the public reaction is variable and mixed to wildlife damage management because there are numerous philosophical, aesthetic, and personal attitudes, values, and opinions about the best ways to manage conflicts/problems between humans and wildlife. Aesthetics is the philosophy dealing with the nature of beauty, or the appreciation of beauty. Therefore, aesthetics is truly subjective in nature, dependent on what an observer regards as beautiful.

Wildlife populations provide a range of social and economic benefits (Decker and Goff 1987). These include direct benefits related to consumptive and non-consumptive use (*e.g.*, wildlife-related recreation, observation, harvest, sale), indirect benefits derived from vicarious wildlife related experiences (*e.g.*, reading, television viewing), and the personal enjoyment of knowing wildlife exists and contributes to natural ecosystems (*e.g.*, ecological, existence, bequest values) (Bishop 1987). Direct benefits are derived from a user's personal relationship to animals and may take the form of direct consumptive use (using up the animal or intending to) or non-consumptive use (viewing the animal in nature or in a zoo, photography) (Decker and Goff 1987). Indirect benefits or indirect exercised values arise without the user being in direct contact with the animal and come from experiences such as looking at photographs and films of wildlife, reading about wildlife, or benefiting from activities or contributions of animals such as their use in research (Decker and Goff 1987). Indirect benefits come in two forms: bequest and pure existence (Decker and Goff 1987). Bequest is providing for future generations and pure existence is the knowledge that the animals exist (Decker and Goff 1987).

WS' blackbird management program occurs on a relatively small portion of the total area in North Dakota and South Dakota, and the current program is a non-lethal program. In localized areas, where WS conducts management activities, blackbirds and possibly other wildlife are dispersed from agricultural fields or from wetlands where cattail fragmentation has occurred but would continue to be present in the area and could repopulated affected areas within a few weeks to several years, depending on the length and kind of management activities or wetland water conditions. Most of the species potentially affected by WS' activities are relatively abundant, and can be observed in areas relatively close to management areas. Effects of WS' blackbird management program on overall wildlife populations is relatively low and opportunities to view, hear, or see evidence of wildlife would still be available in other land areas of the States.

In addition, WS recognizes that all wildlife has aesthetic value and benefit. WS only conducts bird damage management at the request of the affected property owner or resource manager and management actions are carried out in a caring, humane, and professional manner.

Issue 14: Effects on the Physical Environment Not Considered

The following resource values within the analysis area are not expected to be significantly impacted by the alternatives analyzed: soils, geology, minerals, water quantity, flood plains, visual resources, air quality, prime and unique farmlands, timber, and range. These resources will not be analyzed further. USDA (1997) concluded that impacts on air quality from the methods used by the WS are considered negligible.

Issue 15: Cultural Resource and American Indian Concerns

The NHPA and its implementing regulations (CFR 36, 800) require federal agencies to initiate the section 106 process if an agency determines that the agency's actions are undertakings as defined in Sec. 800.16(y) and, if so, whether it is a type of activity that has the potential to cause effects on historic properties. If the undertaking is a type of activity that does not have the potential to cause effects on historic properties, assuming such historic properties were present, the agency official has no further obligations under section 106. Each of the damage management methods used to reduce blackbird damage in North Dakota and South Dakota does not: 1) cause major ground disturbance, 2) cause any physical destruction or damage to property, 3) cause any alterations of property, wildlife habitat, or landscapes, and 4) involve the sale, lease, or transfer of ownership of any property. In general, such methods also do not have the potential to introduce visual, atmospheric, or audible elements to areas in which they are used that could result in effects on the character or use of historic properties. Therefore, the methods that would be used by WS under the current program are not generally the types of activities that have the potential to affect historic properties. If an individual activity with the potential to affect historic resources is planned under the current program or as a result of a decision on this EA amendment, then site-specific consultation as required by Section 106 of the NHPA would be conducted as necessary.

Native American Graves Protection and Repatriation Act. The Native American Graves Protection and Repatriation Act requires Federal agencies to notify the Secretary of the Department that manages the Federal lands upon the discovery of Native American cultural items on Federal or Tribal lands. Federal projects would discontinue work until a reasonable effort has been made to protect the items and the proper authority has been notified.

Issue 16. Irrevererersible and Irretrievable Commitments of Resources

Other than relatively minor uses of fuels for motor vehicles and electricity for office operations, no irreversible or irretrievable commitments of resources result from the proposed action. Blackbird populations are sustainable in the North Dakota and South Dakota, the WS blackbird damage management program does not reduce the acres of wetlands, only the acres of dense cattails within the wetlands, temporarily.

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