National Wildlife Research Center
Wildlife Services
Animal and Plant Health Inspection Service
United States Department of Agriculture
Great Plains Field Station
2110 Miriam Circle, Suite B
Bismarck, ND 58501

Study Protocol

I. Title:

Identification and Quantification of Cattails (*Typha spp*.) and other Emergent Plant Species in the Prairie Pothole Region of North Dakota.

II. Study Director:

George M. Linz, Ph.D.

Principal Co-Investigators:

William J. Bleier, Ph.D., Professor and Chair, Department of Biological Sciences, North Dakota State University, Fargo
Scott T. Ralston, B.S., Masters Student, Department of Biological Sciences, North Dakota State University, Fargo

III. Sponsors:

USDA/APHIS/WS, National Wildlife Research Center, Fort Collins, CO
USDA/APHIS, North Dakota/South Dakota Wildlife Services, Bismarck, ND
Department of Biological Sciences, North Dakota State University, Fargo, ND

IV. Objectives:

1. Objective: Estimate areal coverage of emergent vegetation, especially cattail (*Typha spp*.), in randomly selected sample units in the prairie pothole region of North Dakota.

2. Objective: Describe the physical and biological characteristics of a sub-sample of wetlands contained within the sample units, including basin area, wetland classification, plant species, and areal coverage of emergent vegetation, especially cattails (*Typha* spp).

GOAL: Provide baseline data on areal coverage of emergent vegetation, especially cattails, for wildlife resource managers to make an informed program decision on the management of cattail in relation to blackbird damage to grain crops, as required by the National Environmental Policy Act and the Government Performance and Results Act.

V. Background and Justification:

The prairie pothole region of North Dakota extends across the middle of the state from just east of the Missouri River to the western edge of the Lake Agassiz basin. This region lies at the center of the North American continent and is crossed by a continental divide, separating drainage systems of the Hudson Bay and the Gulf of Mexico (Stewart and Kantrud 1972). Glaciers shaped the

topography of the region during the Pleistocene Epoch. These glaciers formed uneven deposits of glacial till and large buried ice blocks that today make up the prairie potholes and sloughs (Colton et al., 1963).

Production of sunflower in North and South Dakota has grown exponentially from a few thousand acres in the 1960's to nearly 1.1 million acres in 2001 (Lilleboe 1979, North Dakota Agricultural Statistics 2002). Red-winged blackbirds (*Agelaius phoeniceus*), yellow-headed blackbirds (*Xanthocephalus xanthocephalus*), and common grackles (*Quiscalus quiscula*) comprise over 10% of the avifauna in North Dakota and use the rich sunflower crops as energy during their fall migration through the Northern Great Plains. This migration occurs in late summer when the sunflowers are ripening and can cost sunflower growers millions of dollars in damage to their crops (Stewart and Kantrud 1972, Hothem et al. 1988, Lamey and Luecke 1991). Red-winged blackbirds (RWBL) and common grackles (COGR) generate the most damage, with yellow-headed blackbirds (YHBL) also contributing a minor amount during their migration (Homan *et al.* 1994). During fall migration, blackbirds use large stands of cattail as night roosts (Lutman 2000). If these roosts are large and are located near a sunflower field that, field may experience severe damage (Otis and Kilburn 1988). Farmers may prevent excess damage to their crops by avoiding planting sunflower crops near large roosting areas (Arnett 1984). In the prairie pothole region of North Dakota, this may be difficult due to the abundance of wetlands formed during glaciations of the area (Judson and Kauffman 1990). When such conditions exist where crops cannot be safely rotated due to locations of blackbird roosts, farmers must turn to alternative methods of protecting their crops.

Blackbird Populations - Blackbird problems have become increasingly more prevalent due to a recent rise in the numbers of blackbirds. This increase is likely a result of changes in local environmental conditions. Blackbirds were 33% more prevalent in 1998 and 1999 than in the previous two years. The mid-1990's had an above-average annual precipitation. The excess water provided an increase in growth of suitable habitat for the blackbirds, thus producing higher reproductive success (North Dakota Agricultural Statistical Service 1999).

Cattail Management – Cattail (*Typha spp*.) is the dominant wetland emergent vegetation in the prairie pothole region. The type of cattail that is most common is thought to be a hybrid of a broad and narrow leaf cattail (Kantrud 1992). This hybrid is ideally suited for the agricultural environment within its range. The abundance of slightly saline wetlands as well as the frequent disturbance by tillage contributes to the success of cattail growth in the area. Animals such as white-tail deer (*Odocoileus virginianus*), ring-necked pheasants (*Phasianus colchicus*), marsh wrens (*Cistothorus platensis*), waterfowl (Anatidae) and blackbirds (Icteridae) use cattail as an important source of shelter (Kantrud 1992). The over abundance of cattail in some wetlands may also have negative effects for some wildlife. Many waterfowl prefer open water interspersed with emergent vegetation (Linz et al. 1996a, Solberg and Higgens 1993). Shorebirds like the endangered black tern (*Chlidonias niger*) also use wetlands with exposed mudflats and floating masses of dead cattail (Blixt 1993, Linz et al. 1994, Linz and Blixt 1997, Linz. et al. 1997).

Attempts to reduce cattail in some wetlands have been met with success by using an aquatic herbicide. Currently the only aquatic herbicide that is registered with the EPA is glyphosate-based Rodeo® (Ware 1989). Rodeo® can virtually eliminate all treated cattail, but the cattail may grow back in later years (Solberg and Higgins 1993, Linz et al. 1996b). By fragmenting dense cattail stands cattail near sunflower areas, managers may be able to reduce blackbird damage to crops (Lutman 2000). The reduction of cattail may also raise concerns about organisms that benefit from cattail habitat.

The results of this study will provide an estimate for the amount of cattail habitat present in the prairie pothole region of North Dakota. This estimate will include ground coverage in each physiographic region as well as wetland size and type classifications. The study will also provide managers with a qualitative analysis of plant species found in and among the cattail.

Under the auspices of NWRC Study Protocol QA-982, the NWRC, North Dakota State University, and ND/SD Wildlife Services will determine the amount of cattail habitat in the prairie pothole region on North Dakota and its implications for cattail management.

This study will be conducted under National Wildlife Research Center project plan titled "Development and evaluation of management techniques for reducing blackbird damage to ripening sunflower crops and feedlots (July 1999-2004)."

The proposed experimental design is described under Section VII.

VI. Location:

This study will be conducted in the prairie pothole region of North Dakota, including the Drift Plains and the Missouri Cotteau (Fig. 1).

VII. Methods:

A. Procedure:

STUDY AREA AND SITE SELECTION

The prairie pothole region of North Dakota will be stratified into four zones based on biotic differences described by Stewart and Kantrud (1972). The divisions will include the Missouri Cotteau, northwest Drift Plains, northeast Drift Plains, and southern Drift Plains (Fig. 1). Physiographic boundaries will be drawn along the nearest township lines (Fig. 2). A total of 120 (10.37 km^2) sample plots will be determined by randomly selecting the plots. Each of the four physiographic regions will have a percentage of the samples allocated to them based on their proportionate area.

DATA COLLECTION

Data will be collected in 120, 2 X 2 mile sample units as described above. A fixed wing airplane will be used to take aerial infrared images of the study areas. The photography will take place in August, 2002. The photos will be taken using 35mm, Kodak Ektachrome Infrared Film Type IE 135-36. These photos will then be scanned into a tiff format. Once the photographs are taken and digitized, they will then be analyzed using Arc Info GIS software to determine total area of cattail habitat. Ten percent of the sample units from throughout the study area will be visited to ground-truth the aerial photos. Observers will use GPS devices to locate cattail as well as other defining landmarks for use in georeferencing.

While conducting the ground surveys, observers will look for other plant species found in and among the cattail. The target plant species may include those that are rare, endangered or those that if destroyed by cattail management may have a larger impact on the local ecosystem. Samples of these plants may be recorded, collected and preserved.

B. Identification of test, control, and reference substances, mixtures of substances with carriers, materials, and/or devices to be used or tested:

1. Chemical: Not Applicable
2. Material: Not Applicable
3. Device: Not Applicable

2. Test, control, and reference substance accountability:

Not Applicable

3. Experimental design and statistical analyses:

Descriptive statistics will be used to report data.

4. Environmental conditions:

The amount of precipitation during the study season will be obtained from the National Weather Service.

5. Records:

Daily Environmental Conditions during Field Study:
Weather data will be obtained from the National Weather Service, Jamestown, ND, including (a) temperature, (b) precipitation amounts, (c) wind speed, (d) local sunrise and sunset
Plant Surveys
(a) name of observer, (b) section location, (c) date, (d) environmental conditions
Habitat Data
Selected sections will be ground-truthed. The observer will record (a) name of observer, (b) section location, (c) major wetland features (e.g. cattail stands, open water, other emergent vegetation will be recorded on photographic images of the wetland).

6. Authority and permits:

Not applicable

H. Standard operating procedures (SOP):

The following SOP's are relevant to this study:

AD-004.00	Archiving Studies and Specimens
AD-008.00	Personnel Qualification Records
AD-011.00	Data Recording and Error Correction
CH-002.00	Calculations, Significant Figures, and Rounding
HS-004.00	Personal Protective Equipment
HS-008.00	Hazard Communication

1. Analytical chemistry:

Not Applicable

2. Bait formulation:

Not Applicable

VIII. Animal Care and Use:

Date of IACUC Approval: _____

A. Test system: Not Applicable
B. Identification of test system: Not Applicable
C. **Rationale for involving animals, for appropriateness of species, and for numbers:** Not Applicable
D. **Source:** Not Applicable

E. Trapping: Not Applicable
F. Handling/Restraint: Not Applicable
G. Transport: Not Applicable
H. Housing/maintenance: Not Applicable
I. Carrier/diet/contaminants: Not Applicable
J. Route of administration: Not Applicable
K. Dosage: Not Applicable
L. Quarantine: Not applicable
M. Disposition of Animals: Not Applicable
N. Prior studies: Not Applicable
O. Pain:

1. **Alternatives procedures:** Not Applicable
2. **Justification for withholding sedatives or analgesics:** Not Applicable
3. **Consultation with Attending Veterinarian:** Not Applicable
4. **Euthanasia:** Not Applicable

IX. Endangered Species Act compliance:

Is there a possibility that the study, as proposed, will or may affect threatened or endangered species?

Yes:___ No: X

X. National Environmental Policy Act compliance:

Does the study, as proposed, have the potential for significant impact on the environment?

Yes:___ No: X

XI. Employee safety:

All safety rules and regulations of USDA-APHIS will be followed (HS 008.00). Personal protective equipment (HS-004) will be available and used by appropriate personnel.

XII. Schedule:

Proposed Experiment Start Date:	August 2002
Proposed Experiment Termination Date:	September 2003
Proposed Study Completion Date:	May 2005

XIII. Staffing:

Data Collection

FY-02

Title	FTE
Professor (NDSU)	0.08
Wildlife Biologist (NWRC)	0.08
Graduate Student (ND/SD WS)	0.50
Wildlife Technician (NDSU)	0.08

FY-03

Title

Professor (NDSU)	0.08
Wildlife Biologist (NWRC)	0.08
Graduate Student (ND/SD WS)	0.50
Wildlife Technicians (ND/SD WS)	0.08

FY-04

Title	
Professor (NDSU)	0.08
Wildlife Biologist (NWRC)	0.08
Graduate Student (ND/SD WS)	0.50

FY-05

Title	
Professor (NDSU)	0.08
Wildlife Biologist (NWRC)	0.08
Graduate Student (ND/SD WS)	0.50

XIV. Cooperators and consultants:

Phil Mastrangelo, Wildlife Biologist, USDA/APHIS-ND/SD WS, Bismarck, ND
Ryan Wimberly, Wildlife Biologist, USDA/APHIS-ND/SD WS, Bismarck, ND
Bryan D. Safratowich, Master's Student, North Dakota State University, Fargo, ND

XV. Related protocols: None

XVI. Cost estimate for each fiscal year:

	FY-02
1. Salaries and Benefits	40,800
2. Facilities	0
3. Equipment	0
4. Supplies	0
5. Operating costs (Travel, vehicle gas & maintenance)	8,300
Subtotal	49,100[a]

	FY-03
A. Salaries and Benefits	40,800
B. Facilities	0
C. Equipment	0
D. Supplies	0
E. Operating costs (Travel, vehicle gas & maintenance)	8,300
Subtotal	49,100[a]

	FY-04
A. Salaries and Benefits	42,800
B. Facilities	0
C. Equipment	0
D. Supplies	0

E. Operating costs (Travel, vehicle gas & maintenance)	8,300
Subtotal	49,100[a]
	FY-05
A. Salaries and Benefits	40,800
B. Facilities	0
C. Equipment	0
D. Supplies	0
E. Operating costs (Travel - 2 people, publication costs)	2,000
Subtotal	42,800[a]
GRAND TOTAL:	$190,100[a]

XVII. Staff qualifications:

Study participants have documentation supporting education, experience, and training, which qualify them for work they will be performing in this study. All study participants have documentation on file, which verifies their qualifications for the work they will perform on this study (AD-008.00).

XVIII. Archiving:

All raw data, documentation, records, protocols, specimens, correspondence and other documents relating to interpretation and evaluation of data, and final reports generated as a result of this study will be retained in the archives of the National Wildlife Research Center at Fort Collins, Colorado (AD 004.00).

XIX. References:

Arnett, G. R. 1984. Blackbird control in sunflower. The Sunflower 10:37.

Blixt, D. C. 1993. Effects of glyphosate-induced habitat alteration on birds. M.S. Thesis, North Dakota State University, Fargo, North Dakota, USA

Colton, R. B., R. W. Lemke, and R. M. Lindvall. 1963. Preliminary glacial map of North Dakota. U.S. Geological Survey. Geologic Investigations.

Homan, H.J., G.M. Linz, W.J. Bleier, and R.B. Carlson. 1994. Dietary comparisons of adult male common grackles, red-winged blackbirds, and yellow-headed blackbirds in north central North Dakota. Prairie Naturalist 26:273-281.

Hothem, R. L., R. W. DeHaven, and S. D. Fairaizl. 1988. Bird damage to sunflower in North Dakota, South Dakota, and Minnesota, 1979-1981. U. S. Fish & Wildlife Service. Fish and Wildlife Tech. Rep. No. 15. 11pp.

Lamey, H.A. and J.L. Luecke. 1991. Preliminary results of the 1990 North Dakotas grower survey of pest problems and pesticide use. Proceedings Sunflower Research Workshop, Fargo, North Dakota, 10-11 January 1991. pp. 27-29.

Judson, S., and M.E. Kauffman. 1990. Physical Geology. Eighth edition. Prentice-Hall, Inc.

Englewood Cliffs, New Jersey, USA.

Kantrud, H.A. 1992. History of cattails on the prairies: wildlife impacts. In: Proceedings of a Cattail Management Symposium (G.M. Linz, Ed.). U.S. Department of Agriculture, Denver Wildlife Research Center and the U.S. Fish and Wildlife Service, Fargo, North Dakota, USA.

Lilleboe, D. 1979. Crop Reporting Service "Our goal is to provide facts for decision-making". The Sunflower 5:12, 26, 28.

Linz, G.M., D.C. Blixt, D.L. Bergman, W.J. Bleier. 1994. Response of black terns (*Chlidonias niger*) to glyphosate-induced habitat alterations on wetlands Colonial Waterbirds. 17:160-167.

Linz, G.M., D.C. Blixt, D.L. Bergman, W.J. Bleier. 1996a. Response of ducks to gyphosate-induced habitat alterations in wetlands. Wetlands. 16:38-44

Linz, G.M., D.C. Blixt, D.L. Bergman, W.J. Bleier. 1996b. Responses of red-winged blackbirds, yellow-headed blackbirds and marsh wrens to glyphosate-induced alterations in cattail density. Journal of Field Ornithology 67:167-176

Linz, G.M., and D.C. Blixt. 1997. Black terns benefit from cattail management in the Northern Great Plains. Colonial Waterbirds 20:617-621.

Linz, G.M., D.L. Bergman, D.C. Blixt, and C. McMurl. 1997. Response of American Coots and Soras to herbicide-induced vegetation changes in wetlands. Journal of Field Ornithology 68:450-457

Lutman, M.W. 2000. Location and habitat characteristics of late-summer blackbird roosts in the sunflower-growing region of North Dakota. M.S. Thesis, North Dakota State University, Fargo, North Dakota, USA.

North Dakota Department of Transportation. 2002. North Dakota Minor Civil Divisions – Townships Map. North Dakota Department of Transportation. Planning Division, Bismarck, North Dakota, USA

North Dakota Agricultural Statistical Service. 1999. North Dakota Agricultural Statistics 1999. North Dakota Agricultural Statistical Service, Fargo, North Dakota, USA.

North Dakota Agricultural Statistical Service. 2002. North Dakota Agricultural Statistics 2002. North Dakota Agricultural Statistical Service, Fargo, North Dakota, USA.

Otis, D.L., and C.M. Kilburn. 1988. Influence of environmental factors on blackbirds damage to sunflower. U.S. Fish and Wildlife Service, Fish and Wildlife Technical Report 16. Washington, D.C., USA.

Solberg, K.L., and K.F. Higgins. 1993. Effects of glyphosate herbicide on cattail, invertebrates, and waterfowl in South Dakota wetlands. Wildlife Society Bulletin 21:229-307.

Sterner, R. 1995. Shaded Relief Map of North Dakota. John Hopkins University, Applied Physics Laboratory.

Stewart, R.E., and H.A. Kantrud. 1972. Population estimates of breeding birds in North Dakota. The Auk 89:766-788

Ware, G.W. 1989. The pesticide book. Third edition. Thompson Publications, Fresno, California, USA.

XX. Appendices:

None

Any changes in or deviations from this protocol will be documented on the Study Protocol Amendment Form, signed and dated by the Study Director and Research Program Manager. Amendments will be distributed to all study participants.

XXI. Signature Page:

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Study Director Date

Approved:

_____

Director, NWRC Date