PROJECT TITLE: Changes in Plant Community Composition of Prairies within the Souris River Basin National Wildlife Refuge Complex

FY Requested 2012 Funded 2012

Project Proposal

NWR: J. CLARK SALYER NATIONAL WILDLIFE REFUGE

RFP ID: 62620-39-2011

Project Type:	Focus:	Scale:
Monitor	Restoration or Recovery	Multi-station

- [x] Staff Biologist?
- [x] This proposal has station support?
- [x] FWS protocols were followed regarding data managment?
- [x] This proposal supports a priority in a CCP/ HMP or other refuge plan

Applicable Goals and Objectives (USFWS 2007) are numerous because they are derived for each habitat type, specific to each refuge within the complex (e.g., Drift Prairie, Prairie Slope, Parkland, etc). As examples, we provide two objectives for Drift Prairies on J. Clark Salyer NWR.Obj 1) By 1 year after CCP approval, use current vegetation inventory data and landscape considerations to characterize each habitat management unit with >40 acres of drift prairie as either high or low management priority. Reevaluate prioritization 15 years after CCP approval. Obj 2) On high-priority drift prairie units, apply frequent and precisely timed disturbance (principally fire and grazing) to restore vegetation to the following standards within 15 years of CCP approval. Composition on each unit includes (1) >40% pristine native and native-dominated/ bluegrass-subdominant vegetation (plant groups 41–43, 46– 48, and 53), (2) <20% smooth brome-dominated vegetation (plant groups 61 and 62), and (3) <20% low shrub-dominated vegetation (plant groups 11– 17); based on percentage frequency of occurrence on belt transects (Grant et al. 2004a).

- [ ] This proposal supports a "Top Region 6 Priority"

PROJECT DESCRIPTION

Fee title lands within the Souris River Basin National Wildlife Refuge Complex (SRB) include the largest collective holding of U.S. Fish and Wildlife Service (USFWS) prairies remaining within the Prairie Pothole Region, including about 56,145 acres of native sod (i.e., areas without a previous cropping history). Invasive plants, particularly smooth brome, Kentucky bluegrass and weedy forbs (e.g., leafy spurge, Canada thistle, sweet clover) pose an imminent, widespread threat to biodiversity of these prairies. Restoration of prairies is an explicit goal within Comprehensive Conservation Plans (CCPs) for the SRB NWRs and J. Clark Salyer Wetland Management District (WMD). Additionally, conservation and restoration of native prairie is a 2012 Regional Resource Priority (RD's Memo 11/2011); covers two of the National Priorities in the Strategic Plan for Inventories and Monitoring on

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National Wildlife Refuges: Adapting to Environmental Change (2010), including baseline inventory of biota (vegetation) and supporting adaptive management at refuge and landscape scales; and Plains and Prairie Potholes LCC priority number two, developing information that can assist in the conservation and restoration of landscapes capable of maintaining ecological services. Plant composition was inventoried for all prairie tracts within the SRB Complex during 2001-2004. Based on these inventories, coupled with 20 years of applied research, prairie tracts were prioritized by the probability of successful restoration. High priority tracts have better floristic composition, are larger, and/or are adjacent to other USFWS prairies or private pastures. Restoration-based objectives were then developed for high-priority prairies (grouped by habitat type) within the complex. Restoration objectives are specific, measurable, and realistic (e.g., see Chapter 4, USFWS 2007). Following principals of adaptive management, high priority tracts require periodic assessment of progress in attaining stated objectives, and where necessary adjusting those objectives. Monitoring intervals of 5-10 years were identified in CCPs (see Science Objectives, USFWS 2007). Herein we request support for completing the first comprehensive monitoring cycle for prairies within the SRB Complex. Results will be utilized to determine if and how prairie plant communities have changed since original inventories. Results have implication for nearly all NWR complexes in North Dakota, South Dakota, and Northeast Montana.

OBJECTIVES

Objective 1: Use prior inventory sites/transects (completed in 2004) to document the contemporary composition of native prairies within the SRB Complex (i.e., J. Clark Salyer NWR, Upper Souris NWR, Des Lacs NWR, and J. Clark Salyer WMD). Justification: Results provide information on the current condition/composition of prairies within the complex, similar to original inventory data. Data on current composition are critical for: 1) developing/refining habitat goals and objectives, 2) analyses of wildlife species-habitat relationships, and 3) developing management strategies to address invasive plants.Objective 2: Use pair-wise comparisons to assess changes in prairie composition between the two sampling periods (i.e., 2004 inventory and current monitoring). Justification: Within the SRB Complex, projected prairie composition is defined by objectives established in CCPs. Magnitude and direction of change inform management about 1) general successes in meeting restoration objectives identified in CCPs and 2) the utility of those objectives as established in CCPs (are they realistic or in need of adjustment).

Objective 3: Determine if management is related to changes in prairie composition. Specifically, determine if the composition of prairie tracts and/or changes in composition between sampling periods is related to an index of the relative frequency of management (i.e., fire, grazing, haying).Justification: Restoration or maintenance of high-quality prairies is related, in part, to management history of prairie tracts. The frequency and type of management is related to prairie composition; however, much uncertainly remains regarding how management influences composition. Specific strategies for restoration of prairies have been proposed in CCPs, with many implemented during the past 10-15 years. Moreover, the influence of management actions is a critical element of NPAM, although NPAM includes more comprehensive and rigorous assessments than what is proposed here.Objective 4: Can periodic monitoring (e.g., frequency of 5-10 years) inform management, given the dynamic nature (i.e., highly variable) of northern prairie grasslands? This project has broader implications for USFWS prairies in the prairie pothole region (beyond those above for the SRB Complex). Scientific investigations (including inventory of all

prairies) within the SRB Complex provided the foundation for inventory of all prairies in the Dakotas and northeast Montana. As such, participating USFWS Complexes have the opportunity to collect data on the contemporary composition of prairies that allow comparison to original inventories, similar to that proposed here. If composition of prairies is highly variable from year to year (i.e., in response to climate or management), then periodic monitoring may be insufficient to capture changes in prairie composition; in these cases, more frequent monitoring may be required. This project serves as a model or test case for the efficacy of "periodic monitoring" of prairies, based on prior inventories conducted in the Dakotas and Montana.

DESIGN AND METHODS

Methods. We utilize the belt transect method described by Grant et al. (2004a). The method also is used for annual monitoring in the Native Prairie Adaptive Management project (NPAM). Additionally, the belt transect method has received extensive peer-review during recent inventory and research projects (e.g., Grant et al. 2004b, Murphy and Grant 2005, Grant et al. 2009, Grant et al. 2010). Transects are distributed randomly within prairies tracts (4,250 transects for SRB Complex). Survey crews navigate to each transect using sub-meter accuracy GPS units. We classify the dominant plant species group at each of 50 contiguous, 0.5 x 0.1-m belts along each 25-m transect (16 belts for an 8-m transect), using a plant species group classification system specific to the region (e.g., Appendix A in Grant et al. 2004a). An observer and data recorder can generally complete >30 transects/day. Data will be stored in either an Access database (in development) or Excel spreadsheet (as per original inventory) and managed according to USFWS protocols. Design. Project design follows that utilized during prior inventories completed in 2004. Study design has been peer-reviewed and is described in detail elsewhere (Murphy and Grant 2005, Grant et al. 2009). In short, we used belt transects to record frequencies of plant species or species groups (Grant et al. 2004a) within each prairie tract. Transects are 25 m long except on some sites with very steep slopes (such as choppy sandhills at J. Clark Salyer NWR), where we used 8- or 10-m transects. We utilize one transect per 1–2 ha of prairie, at a density sufficient to describe composition for each tract. We will utilize the same transects (see methods) used during the prior inventory. High priority prairies will be sampled first, with lower priority tracts sampled as time and resources allow (native sod within the SRB Complex is about 56,145 acres).

DATA ANALYSIS/MODELS

We summarize transect data by percent frequency of occurrence according to specific plant genera or species categories, certain functional groups (e.g., warm-season native grasses), or life form groups (e.g., low-shrub; Grant et al. 2004a, Murphy and Grant 2005). Transects will be grouped by major habitat types (e.g., Drift Prairie, Prairie Slope, Prairie Parkland, etc.) identified in CCPs. Pair-wise comparisons to the original data will be made using standardized statistical methods. Transects also will be summarized by tract or management unit to complete an analysis of changes in plant composition relative to the frequency of management. To facilitate this analysis, a defoliation index (DI) will be calculated for each management unit that reflects the degree of management activities utilized since the prior inventory. We define the index as DI = the number of management actions (e.g., grazing, burning, haying) that have occurred during the past 10 years/year since last disturbance. For example, a unit that has had 2 prescribed fires and one prescribed graze during the past 10 years and that was last defoliated 2 years ago would have a DI = 3

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events/2 years (DI = 1.5). The higher the index, the more management a unit has received during the past 10 years. Standard statistical methods will be used to determine if and how previous management of tracts is related to composition of those tracts.

REVIEWERS:

R. K. Murphy, F. DurbianInventory design previously reviewed by T. L. Shaffer (USGS)

PARTNERS

Participating stations within the SRB Complex.

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2012	2012

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SOURCES OF SUPPORT:

Years Funding Requested: 2

Request From I&M Program:	$94,085.00
Contributed By Station:	$107,080.00
Contributed By Partners:	$0.00
Allocation Grand Total:	$201,165.00

Salary & Benefits:	$83,520.00
Equipment:	$10,565.00
Contracts:	$0.00
Travel:	$0.00
Other:	$0.00

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	Year 1		Year 2		Year 3	
Personnel 1:	Technician	$41,760.00	Technician	$13,920.00		
Personnel2:			Technician	$13,920.00		
Personnel3:			Technician	$13,920.00		
Salary and Benefits Sum:		$41,760.00		$41,760.00		
Equipment:				$10,565.00		
Contracts:						
Travel:						
Other:						
Project Cost IM:		$41,760.00		$52,325.00		$0.00
Station Contribution:		$43,540.00		$63,540.00		
Partner Contribution:						
Project Cost Totals:		$41,760.00		$52,325.00		$0.00
Allocation Totals		$85,300.00		$115,865.00		$0.00

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	Year 4		Year 5	
Personnel 1:				
Personnel2:				
Personnel3:				
Salary and Benefits Sum:				
Equipment:				
Contracts:				
Travel:				
Other:				
Project Cost IM:		$0.00		$0.00
Station Contribution:				
Partner Contribution:				
Project Cost Totals:		$0.00		$0.00
Allocation Totals		$0.00		$0.00

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DATA MANAGEMENT:

Description of data entry, verification, editing and software.

Data will be stored in either an Access database (in development based on NPAM database) or Excel spreadsheet (as per original inventory) and managed according to USFWS protocols. All field records and electronic data will be copied and securely archived on- and off-site to minimize potential loss. Data will be available for stations that comprise the SRB Complex.

Please describe metadata including the who, what, where, and when of the data.

Please describe data security and archiving. Provide the schedule and location for regularly backing up files.

STATUS AND RESULTS

Results from the original inventory are archived at J. Clark Slayer NWR and are described in Murphy and Grant (2005), Grant et al. (2009), and USFWS (2007).

ADDITIONAL INFORMATION:

LITERATURE CITED:

Grant, T. A., B. Flanders-Wanner, T. L. Shaffer, R. K. Murphy, and G. A. Knutsen. 2009. An emerging crisis across northern prairie refuges: prevalence of invasive plants and a plan for adaptive management. Ecological Restoration 27:58–65.Grant, T.A., E. M. Madden, and G.B. Berkey. 2004b. Tree and shrub invasion in northern mixed-grass prairie: implications for breeding grassland birds. Wildlife Society Bulletin 32:807-818.Grant, T. A., E. M. Madden, T. L. Shaffer, and J. S. Martin. 2010. Effects of prescribed fire on vegetation and passerine birds in northern mixed-grass prairie. Journal of Wildlife Management:1841-1851.Grant, T. A., E. M. Madden, R. K. Murphy, K. A. Smith, and M. P. Nenneman. 2004a. Monitoring native prairie vegetation: the belt transect method. Ecological Restoration 22:106-112.Murphy, R. K., and T. A. Grant. 2005. Land management history and floristics in mixed-grass prairie, North Dakota, USA. Natural Areas Journal 25:359–368.U.S. Fish and Wildlife Service. 2007. Comprehensive Conservation Plan, Des Lacs National Wildlife Refuge, J. Clark Salyer National Wildlife Refuge, and Upper Souris National Wildlife Refuge. Available online at http://www.fws.gov/mountain-prairie/planning/ccp/nd/dsl_jcs_usr/dsl_jcs_usr.htmlU.S. Fish and Wildlife Service. 2008. Comprehensive Conservation Plan: North Dakota Wetland Management Districts. Available online at http://www.fws.gov/mountain-prairie/planning/ccp/nd/wmd/wmd.html