2001 Project Abstract
For the Period Ending June 30, 2004

FINAL REPORT

TITLE: Burn, Plant and Learn: Restoring Upland Habitats
PROJECT MANAGER: Shawn Schottler
ORGANIZATION: St. Croix Watershed Research Station (Science Museum of MN)
ADDRESS: 16910 152nd St. North
FUND: Trust Fund
LEGAL CITATION: ML 2001, 1st Special Session, Ch. 2, Sec. 14, Subd. _10 (_e_)

APPROPRIATION AMOUNT: $230,000

Overall Project Outcome and Results

- Overall, *Burn, Plant and Learn* has protected eight acres of habitat and directly assisted with the restoration of over 39 acres of prairie. Through outreach, technical assistance, and equipment lending, over 75 individuals, private landowners, or conservation groups have been assisted or educated in creating highly diverse prairie restorations.
- Research conducted through *Burn, Plant and Learn* will have a significant impact toward advancing the commitment and techniques for creating more diverse prairie habitats.
- Acquisition and permanent protection of eight acres of key habitat bordered by 160 acres of SCWRS preserved lands, adding to the existing the St. Croix Greenway Corridor
- Restoration of 28 acres to high diversity prairie for four landowners within Washington Co.
- Initiation of two major prairie restoration research studies encompassing six acres of the purchased site, and five acres of adjacent lands; serving as both restorations of native habitat and as study sites to evaluate techniques that increase floristic diversity in restorations.
- Development of a restoration equipment lending program providing access to a tractor, harrow, disk, sprayer and burn equipment.
- Leasing of equipment to eight different landowner/groups, assisting in the restoration of 22 acres, totaling over 145 hours of use.
- Creation of a shared restoration-research internship program between Bethel college and the SCWRS; sponsoring three undergraduate interns assisting with field research and restoration

Project Results Use and Dissemination

- Results from the two restoration-research studies: 1) Techniques for maximizing diversity in prairie restorations, 2) Role of floristic diversity in improving habitat quality of grassland restorations, were presented at three major conferences.
- Presentation by SCWRS staff on maximizing diversity in prairies were given to 7 local conservation organizations. SCWRS hosted three seminars/demonstration tours helping to educate over 60 participants on techniques to enhance habitat value in restorations.

Date of Report: July 5, 2004

LCMR Final Work Program Report

I. PROJECT TITLE: Burn, Plant and Learn: Restoring Upland Habitats

Project Manager: Shawn Schottler
Affiliation: St. Croix Watershed Research Station (SCWRS)
Mailing Address: 16910 152nd St. N. Marine on St. Croix, MN 55047
Telephone Number: 651-433-5953 **E-Mail** schottler@smm.org **FAX**: 433-5924

Total Biennial Project : $230,000

$ LCMR Appropriation - $ Amount Spent: = $ Balance:
$230,000 $230,000 = $ 0

Legal Citation: Laws 2001 First Special Session , Chap. 2 , Sec.14, Subd. 10e.

Appropriation Language:
10(e) Burn, Plant and Learn: Restoring Upland Habitats $230,000, $115,000 the first year and $115,000 the second year are from the trust fund to the Science Museum of Minnesota for acquisition of approximately eight acres of property adjacent to the St. Croix Watershed Research Station and for training programs, technical assistance and demonstrations of upland habitat restoration. This appropriation is available until June 30, 2004, at which time the project must be completed and final products delivered, unless an earlier date is specified in the work program.

II. and III. FINAL PROJECT SUMMARY

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IV. OUTLINE OF PROJECT RESULTS:

Result 1: Protection of Tornquist site

LCMR Budget : **$152,977**

Balance: **$ 0**

The purchase of the Tornquist site was successfully completed and the SCWRS now has full and clear title to the entire 8 acre parcel designated for protection as part of this LCMR project. Barb and Lowell Tornquist donated their property to the Presbyterian Church Foundation, with the understanding that the Church would in turn sell the property to the SCWRS at the appraised value of $152,000. The sale of the property from the Church to the SCWRS was closed on February 7, 2003. Additional costs of $977 were associated with the final purchase.

Acquisition of the property was not completed until February of 2003 due to several delays "created" by the Presbyterian Church Foundation including late scheduling of the Phase I Environmental Assessment, belated drafting of the Purchase Agreement and a late request to complete the necessary title search. All phases of the sale were reviewed and co-executed by attorneys at the law firm Winthrop and Weinstine. Their assistance in completing this purchase was invaluable, and all services were provided *pro bono* to the SCWRS.

A notice of Funding Restriction was attached to the title at the time of closing, February 7, 2003. The Notice of Funding Restriction was drafted in accordance with the Laws of Minnesota, Statute 116P.15, and provides that the property must be maintained in a natural state---per accordance with the objectives specified in the *Burn, Plant and Learn* grant agreement. This restriction essentially acts as a form of Conservation Easement/Covenant on

the property and will be incorporated into any subsequent Conservation Easements that are drafted by the SCWRS that include this site.

The ultimate goal is to restore the site to a savanna-prairie complex, similar to the native habitats predicted at the time of European settlement. Because acquisition of the property was delayed until 2003, restoration work could not begin until the winter of 2003/2004. Restoration objectives and activities for the property are being done as part of a prairie restoration study described in Result 2.

	Budgeted	Spent
Acquisition: 8 acres	$ 152,977	152,977

Result 2: Restoration Demonstration

LCMR Budget : $ 17,000

Balance: $ 0

The ultimate objective for the Tornquist site and surrounding "old fields" is to restore them to a savanna-prairie complex, similar to the native habitats predicted at the time of European settlement. Portions of the Tornquist site and several adjacent areas are being used as large-scale restoration experiment sites. These study sites serve as both restoration demonstration areas and as focal points of future workshops and seminars. Because the Tornquist property was not acquired until February 2003, implementation of the first restoration demonstration plots was implemented on a site adjacent to the Tornquist property during the 2002 growing season. Using funding from two additional grants, a second restoration demonstration/study project was initiated on the Tornquist site during the winter of 2004.

In the summer of 2002, the SCWRS initiated a long term research project designed to investigate the effectiveness of various restoration methods for maximizing diversity in prairie restorations. The study is evaluating the relationship between seeding rates, species composition and planting time on the resulting floristic diversity in prairie restorations. In general the study is designed to demonstrate that it is possible to create highly diverse plantings, with many forbs, at an economical cost by appropriately adjusting seeding rates (lbs/acre) and species composition of seed mixes. Because the "experiment area" utilizes over 5 acres of land and is implemented with a diverse mix (>50 species) of local eco-type seed, the study site(s) will ultimately result in the restoration of a high quality native plant community. This research is directed at evaluating current restoration techniques and will serve as a poignant and practical demonstration to both professional restorationists and private landowners.

The restoration demonstration started in 2002 is the first phase of what is designed to be an ongoing long term study. Over time the study will enhance the knowledge base of defining

the most efficient methods for enhancing species diversity in prairie plantings. The demonstration area encompasses a grid of 10m x 10m plots covering a 5 acre area, each representing a combination of the variables described below. All plots are duplicated in triplicate to provide statistical verification. The site is adjacent to the Tornquist property and consisted of similar old-field vegetation at the onset of restoration. The entire site was burned in May of 2002 to remove thatch and stimulate the weed seed bank. The restoration tests and compares the following set of restoration techniques:

- Three sets of species compositions: 75% grass + 25% forbs; 50% grass + 50% forbs; 25% grass + 75% forbs.
- Fall planting versus spring planting, using a broadcast method.
- Five planting densities ranging from 10 seeds/ft^2 to 80 seeds/ft^2
- Three types of site preparation methods: 1) two herbicide applications and no soil tillage; 2) two herbicide applications and shallow soil tillage; and 3) two herbicide applications and repeated deep tillage.

This study is also unique because each experimental combination uses an equal (and measured) number of seeds of each grass or forb species (total amount of seed varies with each plot, but the number for each species is kept equal). Thus the plots provide a one-of-a-kind opportunity to examine how competition and maturation affect species establishment and ultimately the creation of high quality, species diverse habitat. A total of 137 demonstration plots have been established to date--77 plots were planted in the fall/spring of 2002-2003 and 60 plots in the fall/spring of 2003-2004.

To our knowledge this is the only study of its kind testing this suite of restoration variables using a high species diversity (>50 species) and equal amounts of each species. Data collection and expansion of the plots is continuing as part of other SCWRS grant funded projects. Findings/result from the first two growing seasons will be presented at the 2004 North American Prairie Conference.

Using funding from two additional grants, a second restoration demonstration project was begun on the Tornquist site in 2004. In this project, the Tornquist site will be restored to a mesic native grassland community using 52 species of grasses and forbs. (Forbs will comprise greater than 50% of the total mix). The reconstruction will be implemented in a manner to both create high quality habitat and simultaneously be used as a study plot to evaluate "patch seeding" as a technique to maximize floristic diversity. Six acres will be divided into four approximately equal quadrants. Two diagonally opposite quadrants will be planted with a homogenized mixture of all 52 species, at a rate of 40 seeds per square foot. The remaining quadrants will be divided into duplicate sets of 9 sub-plots. Each sub plot will be planted with a different mixture containing a 13 species sub set. (This is a type of "patch" seeding technique.) The cumulative amount of seed and species used on the sub-plots would equal the amount used to plant the homogenized quadrants. As the plots mature, they will be evaluated for floristic diversity using Simpson's Diversity Index. Diversity Indexes will be calculated on a per acre scale. The objective of this planting design is to demonstrate that floristic diversity can be maximized by altering seed mixes and planting in a "patchy" manner, minimizing the extent of aggressive species.

	Budgeted	Spent
Personnel: Shawn Schottler (paid per grant)	$ 17,000	17,000

Result 3: Equipment lending program

LCMR Budget : $11,539

Balance: $ 0

Individuals interested in doing restoration projects are often frustrated by a lack of access to necessary equipment. Through this LCMR grant, the SCWRS in partnership with Belwin Foundation has developed a low-cost equipment "rental" service for local landowners. The SCWRS has purchased a variety of equipment necessary for large-scale restoration, with the specific purpose of making it available to local landowners. Equipment is available to landowners and outdoor/sportsmen groups throughout the lower St. Croix area for a small rental fee. (Often, use of the equipment has been at no charge.) Qualified landowners can lease and operate the equipment themselves or they can contract with local farmers for assistance. Several local farmers have been contacted and have agreed to assist landowners with operating the equipment if necessary. Equipment purchased though the LCMR-Burn, Plant, Learn program includes:

- International 656, 55 horsepower tractor, with hydrostatic drive which makes its operation very similar to a riding lawnmower.
- Disc, 10 foot
- Rotary Harrow-Phoenix, 8 foot.
- Sprayer, 300 gallon pull-type with 12 volt electric pump. The sprayer can serve the dual purposes of water supply tank for prescribed burning and as a herbicide sprayer for site preparation.
- Burn equipment: Assortment of water backcans, drip torches, rakes, flappers.
- Backpack sprayer

Belwin foundation is working in close cooperation with the SCWRS to assist landowners with restoration projects. During 2001, Belwin acquired a Truax no-till seed drill, and a Vicon broadcast seeder. Both pieces of equipment are also available to landowners conducting cooperative restorations with the SCWRS.

The tractor and associated equipment were loaned to two Washington County landowners during this project, assisting in the restoration of about 22 acres. Through 2004, this equipment has been used for about 45 hours of restoration work. The equipment remains available to the public; however, use of the tractor and tillage equipment has been limited because transporting (or driving) the equipment to the landowner site can be cumbersome. In several cases it has been more efficient to enlist the aid of a local farmer to do site preparation. The SCWRS often acts as the coordinator between the landowner and the farmer. The equipment has also been essential to continuing the restoration projects

conducted by the SCWRS. Having this equipment has been invaluable in allowing the SCWRS to implement several large restoration/research projects. From 2002-2006 this equipment will have been used to establish approximately 37 acres of prairie restorations and restoration study sites as part of SCWRS field research.

Prescribed burn equipment available through the equipment lending program has been very popular. Backcans, drips torches, and rakes/flapper have been loaned to eight different landowner groups to conduct at least 14 prescribed burns. Burn equipment has been utilized for approximately 100 hours, and most landowners indicated that they could not have conducted their burns if they had not been able to get burn equipment through the SCWRS lending program. The SCWRS will actively continue and promote the use of the burn equipment and will try to supplement the inventory to accommodate the focused need for the equipment during the short window of opportunity in April/May.

		Budgeted	Spent
Personnel:	Belwin- Contract for Services.....	$ 1,395	1,395
Equipment:	Restoration equipment.....	$10,144	10,144

Result 4: Training and Technical Assistance

LCMR Budget : $ 48,484

Balance: $ 0

Through the *Burn, Plant and Learn* program SCWRS staff was able to provide extensive technical assistance and outreach on prairie restoration to many local landowners and non-profit conservation organizations. The SCWRS also partnered with Bethel college to sponsor an intership research program, that examined the link between increased of floristic diversity and habitat value in reconstructed prairies.

SCWRS staff scientist, Shawn Schottler, actively assisted four Washington County landowners with implementing prairie restorations on their property. Technical and manual assistance was provided for all phases of their projects including burning, herbicide application, tillage, and planting. In October, 2002 two sites, totaling 16 acres were planted with 55 species of local ecotype seed (all seed originated from native sources within the lower St. Croix watershed). An additional 10 acres were planted in the Fall of 2003 and 2 acres in April of 2004. In both plantings, forbs comprised more than 60% of the seeds. Between the four sites, a total of 28 acres were planted. Once established these plantings will represent some of the most diverse restorations in east Central Minnesota and may also serve as a source of local ecotype seed. The SCWRS also provided technical outreach via phone consulting and site visits for numerous landowners interested in conducing restorations. Projects implemented though *Burn, Plant and Learn* have increased the visibility the SCWRS as a restoration resource and staff will continue to provide restoration assistance and outreach informing landowners on the importance of increasing plant diversity and habitat value in prairie plantings.

Awareness about the restoration capabilities of the SCWRS is steadily increasing. Many local non-profit organizations have requested the SCWRS to attend local meetings and give presentations about upland ecology and restoration techniques. During the *Burn, Plant and Learn* project presentations on prairie restoration and diversity were given at the Marine Civic Club, Stillwater High School, The Prairie Enthusiasts Workshop, Washington County Historical Society, and St. Croix Homestead Park, Hormel Nature Center and Mower County Pheasants Forever. In partnership with Great River Greening (St. Paul, MN) the SCWRS hosted a restoration workshop in September, 2002. Twenty five participants attended the day long workshop and were given instruction on the techniques and ecology of prairie restoration. The workshop included tours of restored prairies near the SCWRS that demonstrated a variety of planting and site preparation methods. A second restoration techniques tour and seminar was given as part of a Minnesota Naturalist Society meeting held at the SCWRS in November 2002. SCWRS staff presented a series of 1 hour seminars on land - water interactions of Minnesota's native habitats. Naturalists from throughout the State were then given a tour of restored areas and restoration study sites on SCWRS lands. Tours/demonstration were specially focused on helping the Naturalists understand what a "quality" restoration should look like and how to efficiently create it. A tour of restoration demonstration plots described in Result 2 was given in July, 2003.

Over the past three years the SCWRS has also partnered with Stillwater High School on a prairie plant propagation project. The SCWRS has supplied the high school with variety of local eco-type seeds and assists the school with propagating and marketing the seeds/plants. Students at the High School have propagated the plants as part of several class experiments. Students grow the plant--all of local ecotype origin-- in the school greenhouse, and sell half of the plants at a spring plant sale. This event provides a great opportunity to introduce local gardeners to the potential of utilizing Minnesota's native plants in landscaping.

Through *Burn, Plant and Learn*, the SCWRS has formed a partnership with Bethel college to create a student internship program facilitating joint research projects. Three summer undergrad interns have been sponsored by this program. The interns assist with two main research initiatives. Teresa DeGolier a professor at Bethel College, St. Paul and SCWRS staff conduct an annual study comparing the habitat quality (relative to small mammals) of restorations with high plant diversity versus restorations dominated by a few grass species. Results from the first two field seasons indicate much greater abundance and diversity of mice and vole species in restorations with increased plant diversity. Given that small mammals are a critical component at the base of the food web, the results of this study highlight the need to incorporate more diversity in the traditional restoration recipes, and thus create better quality habitat. Results of this study have been presented at the St. Croix Research Rendezvous Conference and The Natural Areas Association annual meeting. Attendees expressed strong support for expanding these types of studies that quantify the "success"(habitat value) of different types of restoration methods. A follow-up presentation is scheduled to be presented in August at the 19th North American Prairie conference

Student interns and Dr. Jeff Port, (Bethel College) started a companion habitat study in 2003 examining the relationship between floristic diversity and songbird nesting preference in restored grasslands. This is a complimentary study to the continuing work of Teresa DeGolier,

studying small mammal abundance in restorations with varying levels of floristic diversity (see previous progress summaries). Preliminary results of the grassland songbird study suggest a similar conclusion---increasing plant diversity increases habitat value to songbirds. However, findings from the songbird study are much more species specific and have trends that vary seasonally. The Bethel-SCWRS internship program conducting both the songbird and small mammal studies will be continued in the 2004 field season as part of other on-going SCWRS grant funded programs.

		Budgeted	Spent
Personnel:	Shawn Schottler, SCWRS.....	$ 35,160	35,160
	Intern/Student Stipends	$ 11,358	11,358
Equipment:	Field supplies, tools, fuel	$ 1,966	1,966

V. TOTAL PROJECT BUDGET*

All Results: Personnel:	**(grant aided SCWRS staff)**	**$ 52,160**
	(Internships/ Student stipends)	**$ 11,358**
	(Belwin-Contract Services)	**$ 1,395**
All Results: Equipment:		**$ 12,110**
All Results: Development:		**$ 0**
All Results: Acquisition:		**$ 152,977**
All Results: Other:		**$ 0**
***TOTAL BUDGET:**		**$ 230,000**

Note: budget reflects amount approved in last project update, December 2003.

VI. PAST, PRESENT AND FUTURE SPENDING:

Past Spending:

- MN-DNR Conservation Partners (1998): CP99-6.13 Restoration of Fields: $ 18,500
- MN-DNR Metro Greenways, May-St. Croix Corridor (1999-) : $350,000
- Belwin Foundation; Seed Production Partnership (1999-): $ 50,000

Current and Future Spending:

Restoration and maintenance of the Tornquist site and adjacent SCWRS lands will be ongoing objectives. The SCWRS will continue to seek funding for restoration projects and to provide landowners with technical assistance. Two grants aimed at facilitating long-term restoration goals were awarded in 2003 to continue restoration efforts on the site through 2005.

- MN-DNR Conservation Partners: St. Croix Ecotype Database (Submitted March 31, 2001); $ 24,200
- National Park Service: Grant # 74081 St. Croix Ecotype Project, Full Funding approved April 1, 2001 $ 6,600

Project Partners:

Belwin Foundation,

Belwin Foundation and the SCWRS have partnered to form the Upland Restoration Alliance (URA). The URA is a grassroots organization to restore and protect the uplands of the lower St. Croix. The URA is a non-profit program funded through membership, donations, and sale of seeds. The URA will serve as the umbrella organization to sustain the programs developed through this LCMR grant. Belwin's land management staff were contracted to assist with equipment maintenance, modification of equipment, and assisting users with equipment operation.

Time: July 2001–June 30 2004.

Restoration projects take several seasons to complete and study. In order to maintain continuity between students and landowners, facets of this project were conducted during a three-year period. All objectives have been completed by June 30, 2004.

VII. DISSEMINATION:

Results have from this project have been disseminated through several venues. Prairie restoration tours and workshops were held in September and November 2002 and July 2003. Results of restoration studies have been presented at two major conferences and a third presentation is scheduled for August 2004. A peer reviewed publication describing the link between floristic diversity and habitat quality is planned for Winter 2005. The SCWRS maintains an active outreach effort and technical consulting to assist landowners with restorations and encourage them to increase the plant diversity of their restorations. Details on each of these dissemination efforts are included in section IV. Research, technical assistance, and outreach conducted through *Burn, Plant and Learn* should have a significant impact at both the professional restoration community level and locally to landowners within the lower St. Croix watershed toward advancing the commitment and techniques for creating more diverse prairie habitats.

VIII. LOCATION:

- SCWRS and Tornquist site: Washington County, May Township, Section 18.
- Project Focus area (includes technical assistance, equipment rental)--All of Washington Co., Southern Chisago Co, Eastern Ramsey and Anoka Co.

IX. REPORTING REQUIREMENTS:

Periodic workprogram progress reports were submitted December 2001, April 2002, February 2003, May 2003, and December 2003.

Project Title: Brun, Plant and Learn: Restoring Upland Habitats

Project Number: '01 EE45; 10(e)

LCMR Recommended Funding: $** **$ 230,000 *Note: Budget reflects dollar amounts approved in the December 2003 project update*

Attachment A Deliverable Products and Related Budget

2001 LCMR Project Biennial Budget **Objective/ Result**

	Result 1 Budget:	*Result 1 Current invoice:*	*Result 1 Balance:*	*Result 2 Budget:*	*Result 2 Current Invoice:*	*Result 2 Balance:*	*Result 3:*	*Result 3 Current Invoice:*	*Result 3 Balance:*	*Result 4:*	*Result 4 Current Invoice:*	*Result 4 Balance:*	*PROJECT TOTAL:*		
Budget Item	**Protection of Tornquist Site:**			**Restoration Demonstations:**			**Equipment Lending Program:**			**Training and Technical Assistance:**			**BUDGET TOTAL:**	**CURRENT INVOICE TOTAL:**	**BALANCE TOTAL:**
Wages, salaries & benefits Shawn Schottler, Ph.D. Interns/Students				17,000	0	0				35,160 11,358	0	0	63,518	0	0
Contracts:Technical Belwin-Equip. Maintance & Operation							1,395	0	0				1,395	0	0
Maintenance															
Other Supplies: Materials/ Supplies for workshops				0	0	0				1,966			1,966	0	0
Tools and equipment: Tractor, mower, sprayer, hand tools, field supplies, fuel							10,144	0	0				10,144	0	0
Office equipment & computers															
Other Capital equipment															
Land acquisition	152,977	0	0										152,977	0	0
Legal fees															
COLUMN TOTAL	$152,977	$0	$0	$17,000	$0	$0	$11,539	$0	$0	$48,484	$0	$0	$230,000	$0	$0