2006 Private Stewardship Grant Program Grant

Title: Kalamazoo Nature Center Fen and Upland Restoration

Objectives: The Kalamazoo Nature Center is seeking funds to assist in the implementation of its Land Management Plan that was drafted in 2005. Restoration is targeted for several zones of property owned and managed by the Nature Center, and is focused on protecting and enhancing fen and upland habitat for 21 known state-listed plant and animal species, including the federal candidate Eastern Massasauga rattlesnake (*Sistrurus catenatus catenatus*), as well as the globally critically imperiled Central Mesic Tallgrass Prairie community (G1G2).

Duration: Restoration activities will begin in December, 2006 and will continue until August, 2007.

Cost Summary: The Kalamazoo Nature Center (KNC) is requesting $71,767 from the Private Stewardship Grant Program to implement an array of restoration techniques at its property in Kalamazoo, MI. The total project cost is estimated to be $83,995. The KNC proposes to provide $12,228 toward the project cost (14.6%) via cash matching and in-kind services.

Contact Information:
Bill Rose, President and CEO
Kalamazoo Nature Center
7000 North Westnedge Ave.
Kalamazoo, MI 49009
269-381-1574
www.naturecenter.org

Project Description

The Kalamazoo Nature Center (KNC) was founded in 1960 on 160 acres of second-growth beech-maple forest in the Kalamazoo River Basin with the intent to preserve a valuable piece of nature for the enjoyment of generations to come. Operating as a private organization (501(c)3), the KNC is considered one of the nation's top nature centers and is supported solely by admission fees and private donations. The KNC now owns and provides for the stewardship of almost 1,100 acres of on-site forests, prairies, savannas, fens, and streams, including nearly two miles of Kalamazoo River floodplain. Each of these communities exists in a variety of ecological health—while portions of the KNC are well intact and require little management, others have been severely degraded due to invasive species competition, development of the surrounding watershed, and a lack of management resulting from limited available funds and direction.

The KNC conducted a biological inventory of the entire property in 2003 and 2004 in order to identify and prioritize management areas based on the conservation and preservation of locally and regionally rare plant and animal species. Based on information collected during this inventory, the KNC drafted a Land Management Plan in 2005 that detailed existing community types and recommended restoration efforts to promote the viability of the 21 state-listed species and 11 locally-rare species located on the property. A detailed list of these species is found in **Table 1**. In addition to the species found on the KNC property, other species known to occur within the Kalamazoo River Basin include Kirtland's Water Snake (*Clonophis kirtlandii*, G2S1), Copperbelly Water Snake (*Nerodia erythrogaster neglecta*, G5T3-S1, also federally PS:LT) and the Barn Owl (*Tyto alba*, G5S1). Although not specifically noted on the property, the interconnectedness of the River Basin community types dictate that these species be considered in the management of the Kalamazoo Nature Center natural areas.

The Land Management Plan was drafted in the context of KNC property (1200 acres) as well as the overall ecological context of southwest Michigan. A unique ecosystem of floodplains, fens, prairies, and upland ridges is found scattered throughout southwest Michigan, with relatively few large parcels left intact following major development that has swept through the area. While each community type has specific needs and sustains distinct groups of flora and fauna, the long term survival of many of these species is dependent upon the contiguous variety of habitat structure and hydrology that is present throughout the KNC property.

Table 1. State-Listed and Locally Rare Species Identified on Kalamazoo Nature Center Property

Scientific Name	Common Name	SRANK**	GRANK**	Listing
Accipiter cooperii	Cooper's Hawk	S3S4	G5	MI-SC
Alasmidonta marginata	Elktoe	S2S3	G4	MI-SC
Baptisia lactea	Prairie False Indigo	S3	G4Q	MI-SC
Berula erecta	Cut-leaved Water Parsnip	S2	G4G5	MI-T
Carex frankii	Frank Sedge	S2S3	G5	MI-SC
Clemmys guttata		S2	G5	MI-T
Dendroica cerulea		S3	G4	MI-SC
Dryopteris celsa	Log Fern	S2	G4	MI-T
Emys blandingii	Blanding's Turtle	S3	G4	MI-SC
Eryngium yuccifolium	Rattlesnake Master	S2	G5	MI-ST
Erynnis persius persius	Persius Duskywing	S3	G5T1T3	MI-ST
Fontigens nickliniana	Watercress Snail	SU	G5	MI-SC
Haliaeetus leucocephalus	Bald Eagle	S4	G5	MI-T
Liparis lilifolia	Lily-leaved Twayblade	S3	G5	MI-SC
Protonotaria citrea	Prothonotary Warbler	S3	G5	MI-SC
Pupilla muscorum	Widespread Column	SNR	G5	MI-SC
Seiurus motacilla	Louisiana Waterthrush	S2S3	G5	MI-SC
Sistrurus catenatus catenatus	Eastern Massasauga	S3S4	G3G4	MI-SC, Fed. candidate
Syphytrichum praealtum	Willow Aster	S1	G5	MI-SC
Terrapene carolina	Eastern Box Turtle	S2S3	G5T5	MI-SC
Central Mesic Tallgrass Prairie		S1	G1G2	

**SRANK and GRANK have been obtained from the Michigan Natural Features Inventory, administered by the Michigan State University Extension Office See: http://web4.msue.msu.edu/mnfi/home.cfm

The KNC is requesting monies from the Private Stewardship Grant Program to implement restoration strategies in 6 zones located on the property that represent approximately 40 acres of natural area (**Figure 1 and Figure 2**). The target zones are comprised of a complex of sedge meadow/fen communities as well as an associated esker, upland ridge, and an offsite mesic tallgrass prairie. While each of these communities is distinct, all are inextricably linked by wildlife passage and water movement among them. Various wildlife are dependent on the adjoining community types for reproduction and survival. For instance, the

Eastern Massasauga rattlesnake (MI species of special concern, candidate for federal listing) requires a combination of open fen habitat for wintering and an associated upland grassy habitat for summering. The combination of these communities in direct proximity to each other is becoming increasingly rare in southwest Michigan, but is present in a degraded state on KNC property. The fen (Zone 1) and upland esker and ridge (Zones 2 and 4) have become increasingly overgrown with woody vegetation and invasive plant species, thus fragmenting and limiting available habitat for the Eastern Massasauga. The mesic tallgrass prairie (Zone 6) is perhaps the rarest of these communities, having been virtually eliminated due to development and fire suppression.

Historically, the fen-upland complex and mesic tallgrass prairie would have been maintained through a regime of fire and other natural disturbances. Without these processes, woody vegetation has encroached upon the grass and sedge dominated systems, thus altering the community types and hydrologic systems that are crucial for supporting the diverse variety of flora and fauna. The presence of woody species limits the growth of the herbaceous understory, which in turn alters the entire ecological community.

In addition to the presence of woody vegetation that has resulted from fire suppression, a number of invasive plant species have also inhabited the site and have further degraded the system. Plants such as Autumn Olive *(Eleaganus umbellata)* and Common Buckthorn (*Rhamnus cathartica*) now occupy the space where native sedges and grasses traditionally thrived. Numerous invasive herbaceous plant species also dominate the upland esker in place of the native grasses and forbs that historically would have been present.

The presence of invasive plant species also has an effect on the overall hydrologic regime of the system. The Kalamazoo River is dependent on clean, slow moving water from the fens. The fens depend on slow-moving groundwater that feed them from the surrounding ridges and eskers. Because woody vegetation has a different effect on groundwater infiltration and uptake than herbaceous vegetation, the entire system may be altered by the presence of invasive plant species. It is important to note, however, that the effects of this vegetation change on groundwater-fed wetlands are not yet fully understood and will therefore be difficult to quantify.

Utilizing its staff and local private contractors, the KNC intends to restore the 6 target areas by removing invasive and/or woody plant species, installing native vegetation, and reintroducing fire to the system in order to encourage the regeneration of herbaceous plant species while suppressing the invasion of trees and shrubs. This process will ultimately increase the habitat for the rare, threatened, and endangered species already known to exist on the property. Restoration efforts will also ensure that lack of management no longer threatens the existing populations of rare species. The KNC performed controlled burns on Zones 1 and 6 approximately 8-10 years ago and initiated woody species

removal in Zone 1 in summer, 2005. However, stewardship efforts have been minimal because of resource shortages in both staff and funding. Due to limited funds available for the stewardship of these valuable natural resources, the KNC is requesting monies from the Private Stewardship Grant Program to implement the restoration efforts developed in its 2005 Land Management Plan.

In addition to active land stewardship, the KNC is actively involved with the community to educate citizens on the importance of conservation and restoration practices. Completing the planned restoration efforts on its property will invite public participation and education to act as a catalyst for future restoration that will support and maintain this important yet threatened ecosystem.

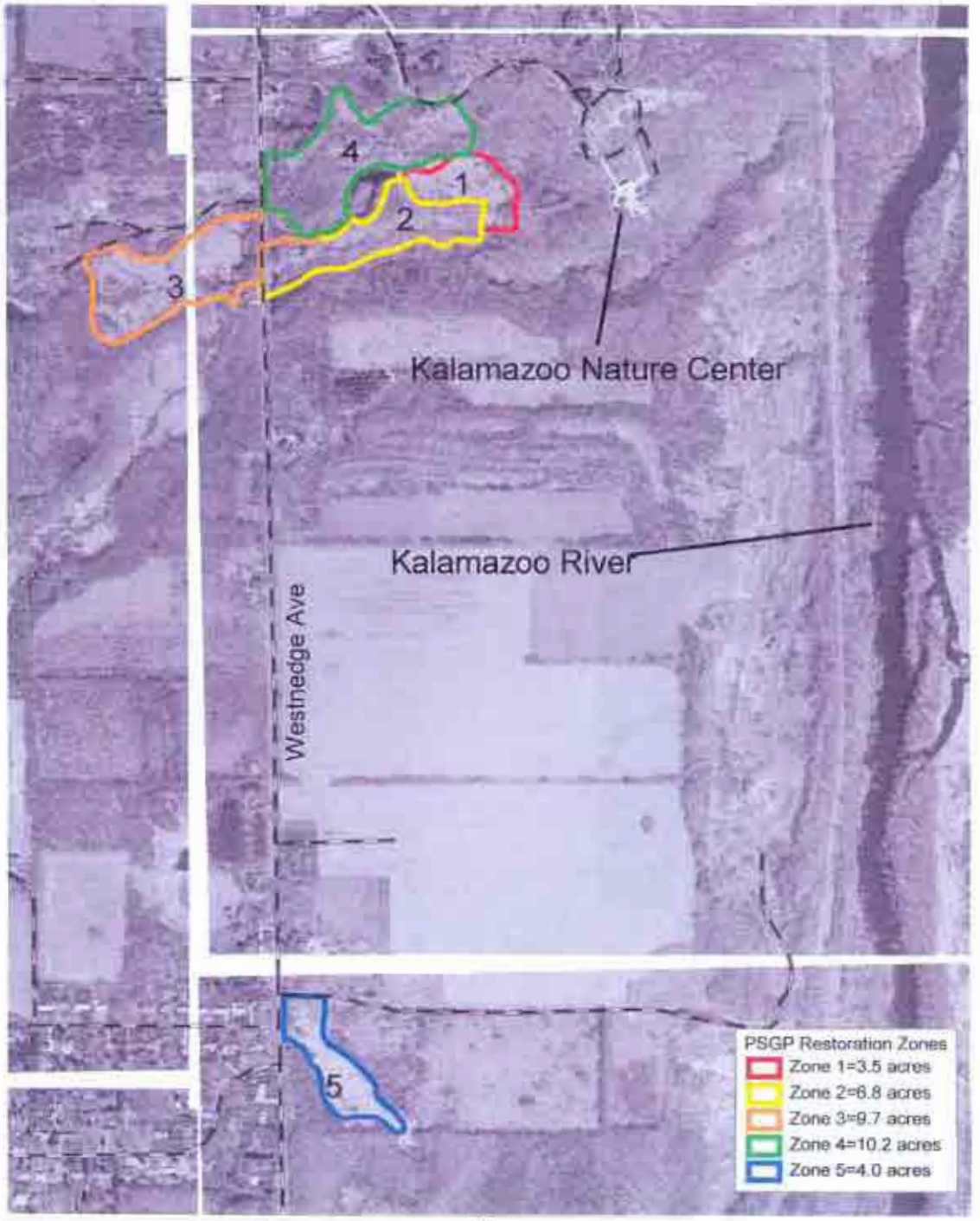

Figure 1
Kalamazoo Nature Center
Private Stewardship Grant
Restoration Zones 1-5: On-site Fens and Uplands

Figure 2
Kalamazoo Nature Center
Private Stewardship Grant
Restoration Zone 6: Oshtemo Prairie

Project Statement of Work

The Kalamazoo Nature Center has identified 6 target restoration zones for immediate restoration efforts based on evaluating the degree of degradation along with the presence of rare, threatened, and endangered species.

Zone 1—Eastern Fen (3.5 acres)
The eastern fen represents one of the highest quality remnants on the property. Once an open fen comprised of sedges, grasses, forbs, and ferns, the fen is becoming overrun with woody and invasive species such as Common Buckthorn. The Eastern Massasauga, Spotted Turtle, and Blanding's Turtle all utilize this zone as critical habitat, as well as numerous other birds, herps, plants, and mollusks.

Restoring the eastern fen will include removal of the invasive shrubs and reintroduction of fire to the ecosystem. Woody vegetation will be removed via a stump-cut treatment, in which the vegetation will be cut, then immediately treated with a 50% glyphosate solution. A controlled burn will remove thatch and any young woody plants not removed during the initial thinning. The burn will be performed during the Eastern Massasauga's hibernatory period to ensure it is not negatively affected by the burn.

Zone 1 has been burned twice while under the management of the KNC--the most recent burn having been conducted approximately 10 years ago. The KNC also began removing woody vegetation from Zone 1 in summer, 2005. Unfortunately, due to limited available resources, these have been the only management efforts performed on this property to date.

The goal for the eastern fen shall be 90-100% removal of all target woody species.

Zone 2—South Esker (6.8 acres)
The south esker is a sand/gravel ridge that runs east-west along the south side of the east and west fens. It is home to the Lily-leaved Twayblade, which requires an open canopy to thrive, and also provides critical summer habitat for the Eastern Massasauga.

Initially, the existing woody species in Zone 2 will be thinned to release the herbaceous understory. Restoration crews will cut or girdle brush/trees with brush cutters and chainsaws, then follow with selective herbicide applications of 50% glyphosate solution to the open wounds. After thinning, the KNC contractor will perform a controlled burn to further promote native plant regeneration. A variety of local-genotype native grass and forb seed will then be installed via no-till native seed drill to reintroduce species that are no longer or marginally present on the esker.

The esker's canopy is currently 50%-80% cover. The goal of the restoration will be to reduce the canopy to 20-30% cover, and also establish 75% groundcover of seeded species at the end of the first growing season.

Zone 3—Western Fen (9.7 acres)
The ecological community of the western fen is very similar to that of the eastern fen. Therefore, restoration efforts will be nearly identical in each fen zone. However, a controlled burn will not be conducted in the west fen due to its proximity to Westnedge Avenue and the limited availability of natural burn breaks, which makesburning this area a hazard.

The goal for the western fen shall be 90-100% removal of all target woody species.

Zone 4—Northern Wooded Ridge (10.2 acres)
Zone 4 is an upland shrub/wooded community to the north of the eastern and western fens. This zone is primarily wooded with a moderately dense canopy and has an abundance of the invasive woody shrubs Autumn Olive and Mulitflora Rose throughout. Scattered throughout the zone are open pockets dominated by non-native cool season grasses. Despite the heavy canopy, the Eastern Massasauga has been observed utilizing this area for summer habitat.

Removing the invasive species and thinning the canopy will encourage the regeneration of the herbaceous understory and increase summer habitat for the Massasauga. Large trees will be selectively girdled and treated with a 50% glyphosate solution, while smaller shrubs and all Autumn Olive will be cut and treated with a 50% glyphosate solution. Restoration crews will treat the cool-season grass openings with 2% glyphosate solution and then reintroduce native grasses and forbs to the open areas via seed and live plant plugs.

Zone 4 is currently 60%-90% canopy throughout. The restoration goals shall be to remove all Autumn Olive and Mulitflora Rose and thin select portions of the zone to 20-30% canopy. Seeded/planted areas shall have 50% cover of planted species at the end of the first growing season. This number may appear low, but it is because some areas can only be established through live plants due to steep slopes and inaccessibility for seeding equipment.

Zone 5—Southern Fen (4.0 acres)
The southern fen (Zone 5) is currently dominated by 90% Reed Canary Grass (*Phalaris arundinacea*). This aggressive invasive species has overtaken virtually all native species in this zone, which historically would have been a fen/sedge meadow complex teeming with native sedges, rushes, grasses, and forbs.

A regime of late-season burning and herbicide applications will be utilized to reduce the reed canary grass populations and to encourage native seed bank

regeneration. In April, 2007, restoration crews will conduct a controlled burn on the site after the Reed Canary Grass has reached a height of 6-8". Approximately 2 weeks following the burn, the crew will apply a broadcast herbicide application of 1.5% glyphosate solution to the entire area. At this time, the Reed Canary Grass will have re-sprouted, though most native species will not have emerged. Follow up selective herbicide applications will be conducted throughout the remainder of the 2007 growing season to treat additional plants that have re-sprouted or emerged from the seed bank.

The goal of the restoration will be to reduce the total Reed Canary Grass population by 60% after 1 growing season. The KNC intends to continue restoration efforts beyond the scope of this grant to ultimately reduce the population by 95-100%.

Zone 6—Oshtemo Prairie (6.4 acres)
The Oshtemo Prairie is an off-site location owned and managed by the Kalamazoo Nature Center. This remnant prairie is classified as a Central Mesic Tallgrass Prairie community, which is classified as globally critically imperiled (G1G2). In addition to the state listed Prairie False Indigo, Rattlesnake Master, and Persius Duskywing, the Oshtemo Prairie would be potential habitat for the state-listed Grasshopper Sparrow, Dickcissel, and Henslow's Sparrow. Each of these rare bird species require large tracts of open grasslands for habitat and reproduction that no longer exist at the Oshtemo Prairie due to woody species obstruction. The KNC performed a controlled burn on the prairie approximately 8 years ago, but has lacked resources to complete any additional management efforts. As a result, the prairie is being encroached upon by a wide variety of woody plant species that are degrading the habitat and limiting the growth of the native herbaceous species.

Initially, large woody species (except large White Oaks) will be removed by chainsaw and treated with a 50% glyphosate solution. Then, all smaller woody plants will be cut with a brush mower and treated with the same chemical solution. Following these activites, the KNC will conduct a controlled burn, *outside the scope of this grant*, in the area to encourage seedbank and plant regeneration.

The goal for this zone will be to remove 90-100% of the target woody vegetation, including White Oaks smaller than 8" DBH.

Monitoring
The KNC will utilize several monitoring techniques before, during, and after restoration activities to quantify project successes. Staff will perform baseline monitoring via transect sampling and photomonitoring prior to restoration activities. Transect sampling will record woody species cover and invasive species cover as it relates to the overall project goals. Staff will also take photos throughout the course of the project to provide documentation of field activities.

Following restoration efforts, the transects will be sampled to assess woody species removal quantities as they relate to overall project goals. Staff botanists and wildlife biologists will complete a species inventory in June-July after major project activities have been completed in order to catalog new species.

In addition to efforts specifically detailed in this grant, KNC staff intends to continually monitor vegetative growth and species populations to assess the success of restoration activities and determine the direction of future efforts.

Project Goals and Milestones

Planned restoration efforts will begin in December, 2006 and will last until August, 2007 **(Table 2).** Each zone will have specific goals and milestones to measure and quantify positive ecosystem changes that result from the restoration efforts. Detailed above, these goals are summarized as follows:

- Zone 1: Remove all non-native woody species and 90% of targeted additional woody species. Perform one controlled burn.
- Zone 2: Reduce canopy to 20-30% and establish 75% ground cover of seeded species by the end of the 1st growing season. Perform one controlled burn.
- Zone 3: Remove all non-native woody species and 90% of targeted additional woody species.
- Zone 4: Cut and treat 100% of Autumn Olive and Multiflora Rose. Thin targeted portions of zone to 20-30% canopy and establish 50% ground cover of planted species in planted zones at the end of the first growing season.
- Zone 5: Conduct a late-season burn. Perform herbicide treatments to reduce Reed Canary Grass populations by 60% by the end of the first growing season.
- Zone 6: Remove 80-90% of target woody vegetation, including White Oaks smaller than 8" DBH

Table 2. Project Schedule

Zone/Task	Dec. 2006	Jan. 2007	Feb. 2007	Mar. 2007	Apr. 2007	May 2007	June 2007	July 2007	Aug. 2007
Zone 1									
Woody species removal	X	X	X						
Controlled burn			X	X					
	X	X	X	X	X	X	X	X	X
Zone 2									
Woody species removal	X	X	X						
Controlled burn			X	X					
					X	X			
	X	X	X	X	X	X	X	X	X
Zone 3									
Woody species removal	X	X	X						
Monitoring	X	X	X	X	X	X	X	X	X
Zone 4									
Woody species removal	X	X	X						
Native plantings					X	X			
	X	X	X	X	X	X	X	X	X
Zone 5									
Controlled burn					X				
Selective herbicide applications					X	X	X	X	X
Monitoring	X	X	X	X	X	X	X	X	X
Zone 6									
Woody species removal	X	X	X						
Monitoring	X	X	X	X	X	X	X	X	X

Project Budget and Partial Funding

The Kalamazoo Nature Center is requesting $70,767 in federal monies to assist in the implementation of restoration efforts on its property in Kalamazoo. The KNC proposes to provide $12,228 in matching funds to equal total project matching of 14.7%. The KNC intends to utilize in-kind services to perform all project management and monitoring of the restoration work. Additionally, the KNC will utilize cash matching to fund portions of the burning and materials necessary to complete the work.

The current plan has been divided into 6 zones, in order of priority. Partial funding shall allow restoration work to be performed in any of these zones independent of the others. However, due to the interconnectedness of the total ecosystem, restoration of all zones will provide the greatest benefit to the rare species on the property.

Table 3. Project Budget

Task	KNC (in-kind)	KNC (cash)	Federal Share	Total
Zone 1				
Project Management	$596			$596
Project Labor		$2125	$8683	$11,520
Supplies/Materials/ Equipment			$753	$753
Total	$1,308	$2,125	$9,436	$12,869
Zone 2				
Project Management	$1,065			$1,065
Project Labor	$892	$962	$7,585	$9,439
Supplies/Materials/ Equipment		$267	$11,538	$11,805
Total	$1,957	$1,229	$19,123	$22,309
Zone 3				
Project Management	$567			$567
Project Labor	$686		$8,968	$9,654
Supplies/Materials/ Equipment			$1,219	$1,219
Total	$1,253		$10,187	$11,440
Zone 4				
Project Management	$988			$988
Project Labor			$13,090	$13,897
Supplies/Materials/ Equipment			$5,298	$5,298
Total	$1,795		$18,388	$20,183
Zone 5				
Project Management	$567			$567
Project Labor		$425	$7,725	$8,722
Supplies/Materials/ Equipment			$1,168	$1,168
Totals	$1,139	$425	$6,893	$10,457
Zone 6				
Project Management	$355			$355
Project Labor			$5,365	$6,007
Supplies/Materials/ Equipment			$375	$375
Totals	$997		$5,740	$6,737

***Project management has been estimated at 5% of the project cost for each zone**

Total in-kind matching = $8,449
Total cash matching = $3,779
Total requested federal funds = $71,767
Total project cost = $83,995

Total project matching, if awarded in this manner = 14.6%

Kalamazoo
Nature
Center

RECEIVED
Region 3
JAN 19 2006
U.S. FISH AND WILDLIFE SERVICE
Ecological Services

January 16, 2006

Peter Fasbender
PSGP Coordinator, Region 3
U.S. Fish and Wildlife Service
Bishop Henry Whipple Federal Building
One Federal Drive
Fort Snelling, MN 55111-4056

RE: Private Stewardship Grant Program

Dear Mr. Fasbender:

The Kalamazoo Nature Center is a private non-profit conservation organization. We are submitting this proposal for funds to assist us in the management of our property that provides habitat for numerous federal and state listed/ranked species and community types.

The Kalamazoo Nature Center started in 1960. We are considered to be one of the largest and most successful nature centers in the country. We own and manage over 4000 acres with 1100 acres on our main program site. This proposal requests funds to do critical stewardship work in our fen and prairie habitats. These community types are rare and listed/ranked species occur in both. The fen contains the massasauga rattlesnake, being considered for federal threatened status.

In recent years, shortage of funding has resulted in biological management for these areas being neglected. We are fully committed to properly managing these areas; however, we need additional funding to make it possible. Over the past two years, we have completed a full biological inventory of the property and developed a biological management plan. During this process, it was determined that the fen and prairie were the highest priority for active management.

I hope your review will be favorable. Please let me know if you need additional information. I look forward to hearing from you.

Sincerely,

Willard M. Rose, Ph.D.
President and CEO

Phone 269-381-1574
Fax 269-381-2557
www.NatureCenter.org

7000 N. Westnedge Avenue
Kalamazoo, Michigan 49009-6309