



Environment and Natural Resources Trust Fund

2023 Request for Proposal

General Information

Proposal ID: 2023-010

Proposal Title: Karner Blue Butterfly Insurance Population Establishment in Minnesota

Project Manager Information

Name: John Moriarty

Organization: Three Rivers Park District

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Project Basic Information

Project Summary: To establish a breeding insurance population of Karner Blue Butterflies for climate mitigation in a restored prairie/savanna at Crow-Hassan Park and assess the quality of habitat on butterfly populations.

Funds Requested: \$422,000

Proposed Project Completion: June 30, 2026

LCCMR Funding Category: Methods to Protect, Restore, and Enhance Land, Water, and Habitat (F)

Project Location

What is the best scale for describing where your work will take place?

Region(s): Metro

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

The Karner Blue Butterfly is a federally endangered butterfly that is a flagship conservation species for endangered oak-savanna ecosystem. Although Karner Blues have a foothold in regions to the east, they are threatened by shifts in climate that may make these areas unsuitable in the future. A recent U of MN model showed optimal habitat will shift north and west, centering on East-Central Minnesota. The present work will establish a climate insurance population of Karner Blues at a site within this new optimal habitat range. Karner Blues were native to several locations in Minnesota but have not been found in the state since 2010. Cedar Creek Ecosystem Science Reserve was one of the known populations and is located only 25 miles from Crow-Hassan, a 1200-acre recreated prairie/savanna system in NW Hennepin County. This prairie includes a high population of wild lupine, which is the required food plant for KBB caterpillars. The site is away from agricultural lands and associated pesticide drift and is continuing to expand its savanna habitat. This work is being conducted in partnership with USFWS, U of MN, and USGS with consultation of the MNDNR. The resulting climate insurance population will be available to other locations

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

This proposal will collect 200 to 500 adult Karner Blues from Fort McCoy Army Base in Wisconsin under a USFWS and MNDNR endangered species permits (applications in process). Fort McCoy has one the largest known Karner Blue populations and is willing to provide adult Karner Blues for this effort. Collected butterflies will be transported to Crow-Hassan's recreated prairie/savanna complex and released at several subsites where egg laying and survival will be monitored. Released Karner Blues will be monitored for 3 years to make sure there is establishment and spread. The release will also be used to address two critical research questions about Karner Blue biology and establishment success – why and how shade on the savannah affects butterfly survival. First, we will address the hypothesis that shade affects the nutritional quality of wild lupine host plants. Second, we will structure the release in different shade microhabitats to test the role of temperature and humidity on egg and caterpillar survival. The research results will help adapt habitat management and release methods for Karner Blue success at this site and elsewhere. This project will also increase the savanna habitat across the Crow-Hassan system by thinning woodlands and planting oaks into the prairie.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

The outcome of this proposal will be an insurance population of Karner Blues in the state that could be used to provide butterflies for other potential introductions in appropriate habitats, including Sherburne NWR and Cedar Creek ESR. This population will assist in climate change migration, or adaptive management. Populations in the southern portion of their range (Indiana) have been lost to climate changes. The techniques developed and information gathered for this project will be shared with other Karner Blue restoration efforts through a handbook and peer-reviewed publications. Results will be shared at conferences, working groups, and public webinars on butterfly.

Activities and Milestones

Activity 1: Increase Savanna habitat and shade grown lupine in the Crow-Hassan complex

Activity Budget: \$175,000

Activity Description:

Karner Blue butterflies depend on oak-savannah habitat, but intact oak-savannah ecosystems are some of the rarest plant communities today. Three Rivers will expand the savanna habitat on the western and southern portions of the Crow-Hassan prairie to make a larger habitat for Karner Blues to accommodate a growing population over time. Savanna habitat will be expanded into 30 acres of buffer woods by thinning of non-oak species and increasing fire rotations and into existing prairies by installing 100 large oaks by tree spade. These areas will be additionally supplemented with plant species on which Karner Blues depend. The enhanced areas will receive additional lupine seed and plants (the host plant of Karner Blue caterpillars). The lupine populations across the prairie will be mapped using the Dept of Defense protocols. A map of the enhancement areas is attached.

Activity Milestones:

Description	Completion Date
Thinning of woodlands	November 30, 2025
Planting of oaks	November 30, 2025
Overseeding of Lupine into enhanced areas and around trees	November 30, 2025

Activity 2: Capture and relocation of Karner Blues from Fort McCoy to Crow-Hassan

Activity Budget: \$6,000

Activity Description:

Fort McCoy is a 90 square mile site 150 miles from the Twin Cities that contains extensive savannah habitat and a healthy population of over 6000 Karner Blue butterflies. A collection group made up of project staff, TRPD staff and partners will travel to Fort McCoy during the first flight period in June 2024. The exact date will be determined by the Fort McCoy endangered species officer. The Karner Blues will be collected in pairs and transported at the end of each day to Crow-Hassan for release. 4 days are planned for collecting and will stop when 500 adult Karner Blues are collected. Transport of the butterflies will be done under USFWS, WIDNR, and MNDNR permits. Transport containers will be finalized with consultation from the MNZOO butterfly biologists and KBB recovery team members. A portion of the butterflies will be released into temporary screen tents to manage egg laying (see Activity 3).

Activity Milestones:

Description	Completion Date
Capture and Release KBB	June 30, 2024
Second Flight period survey to confirm establishment	August 31, 2024
Conduct second Capture and Release if needed	June 30, 2025

Activity 3: Evaluation of lupine nutrition for Karner Blues

Activity Budget: \$44,000

Activity Description:

The monitoring around the Karner Blue release will be structured in a way to address two critical questions that affect butterfly success across their range. Across a range of studies and release efforts, biologists have found that Karner Blues rely on shade for establishment success – females often prefer to lay eggs on lupines in partial shade, but caterpillars tend to thrive in somewhat denser shade. This is thought to be due to lupine drying out in full sunlight, but

the true drivers are unknown. This activity will address the hypothesis that shade affects lupine nutrition and water content, with likely effects on caterpillar growth (see Activity 4). During the summer of 2023, we will harvest lupine leaves to measure the content of key macronutrients (carbon, nitrogen, phosphorus), micronutrients (potassium, sodium, iron), and water content. We will contrast both new and old leaf growth, early and late in the season as plant nitrogen content varies with leaf age and season. Samples will be taken along a gradient of <10% to 100% shade as plant leaf physiology shifts in the shade. These data will be broadly relevant to improving future reintroduction efforts across the eastern United States.

Activity Milestones:

Description	Completion Date
Sample plants in shade microhabitats	May 31, 2024
Evaluation of lupine availability and nutrition	June 30, 2025

Activity 4: Evaluation of Karner Blue caterpillar growth, microhabitat suitability and population establishment

Activity Budget: \$196,000

Activity Description:

Activity 4 will evaluate the establishment of the KBB population at Crow-Hassan, using egg, caterpillar and adult surveys. To monitor larval growth, we will first release Fort McCoy-collected butterflies in large flight cages for 24 hours at a time to concentrate eggs on known patches of lupine. Will monitor larval growth and survival by checking plants for larvae daily. This approach will also allow tests of the hypothesis that shade affects larval survival by buffering temperature and humidity extremes. Eggs will be concentrated in replicate blocks within each of four microsites that vary in the presence of shade to the north or south. Within each block, we will erect a 15 cm x 1 m shade cloth 1-m off the ground as an additional shade manipulation. We will monitor temperature, and humidity within each microhabitat using small sensors, and test for correlations with caterpillar performance.

To monitor adult KBBs, we will use straight-line transects, which can correct for differences in detectability of these very small butterflies across sites. We will perform transect surveys every week during the May-August flight period of the KBB (peaking late May/early June and late July), during the year of release and the year

Activity Milestones:

Description	Completion Date
Monitor and measure caterpillar survival and performance, depending on microhabitat	June 30, 2025
Conduct population estimates for the first and second flights	June 30, 2026

Activity 5: Develop a Karner Blue introduction handbook

Activity Budget: \$1,000

Activity Description:

The techniques developed for this project will be useful for improving on existing techniques and contributing to the successful introduction of Karner Blues into other sites. A handbook of how to collect, transport and monitor the butterflies will provide a template for future activities and assist conservationists in generating a strong foundation on their projects. The handbook will also include BMPs for habitat management and enhancements. This handbook will be developed as an electronic document and distributed as a pdf.

Activity Milestones:

Description	Completion Date
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Data collection and reference review	September 30, 2025
Write Text and gather figures- review and revise	December 31, 2025
Distribute document	February 28, 2026

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Angela Grill	Three Rivers Park District	Lead Field Person for TRPD. Involved with lupine surveys, tree planting, KBB capture and reporting	No
Emilie Snell-Rood, PhD	University of Minnesota	Co-Investigator leading the U of MN monitoring lupine research crew on field work and assisting with KBB collection and coordinating KBB studies (see attachment for qualifications and organization description)	Yes
Jessica Hellman, PhD	University of Minnesota	Project consultant on climate change effects on KBB.	No
TBD - Post Doc	University of Minnesota	Field investigator on caterpillar preference on Lupine and survival strategies. Assist with KBB capture and monitoring	Yes
TBD - Student Worker	University of Minnesota	Assist with research and monitoring	Yes
Jill Utrup	US Fish and Wildlife Service	Provide federal support on permitting and KBB transfer	No
Jessup Weichelt	Dept. of Defense - Fort McCoy	Site manager for butterfly collection	No
Anna Hess, PhD	USGS - Upper Midwest Environmental Sciences Center	Consultant - All things KBB	No

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

The results of this study will assist in future management and monitoring plans and strategies at the Three Rivers Park District and the efforts of current and future Karner Blue land managers and researchers. Data, observations, expert feedback and newly developed techniques gathered at Three Rivers will be analyzed, compiled and distributed to the public, land managers and researchers, and incorporated into existing and future management plans. The long term management and monitoring will be incorporated into Three Rivers Park District's Wildlife operation budget. Habitat management will be ongoing to maintain habitat quality. Monitoring of populations will occur every summer.

Project Manager and Organization Qualifications

Project Manager Name: John Moriarty

Job Title: Senior Manager of Wildlife

Provide description of the project manager's qualifications to manage the proposed project.

John Moriarty has been involved in natural habitat and management in the Twin Cities for over 30 years. He has been the senior manager of wildlife for Three Rivers Park District for the last 9 years. He has restored over 1500 acres of land, mainly prairie, with 12 grants for over \$3,000,000.00 from LSOHC and CPL . This includes work at Crow-Hassan prairie system. He was the co-investigator on the LCCMR funded Urban Turtle Study (M.L. 2015, Chp. 76, Sec. 2, Subd. 03m). John has been a collaborator on several other LCCMR projects including the current Swan Migration study and Urban Coyote and Fox study.

He has been involved in wildlife management throughout his career ranging from deer control, turtle ecology, pollinator

management and species introductions. He successfully planned and led the introduction of and Regal Fritillary Butterflies into Crow-Hassan prairie. The Regal introduction involved receiving state and federal permits, adding specialized habitat enhancements for larval food (prairie violets) and establishing a population monitoring program. John has also worked on Bullsnake, Trumpeter Swan and Osprey reintroductions projects.

John has authored and co-authored a numerous articles and books on wildlife and habitat conservation, including the recent Field Guide to the Natural World of the Twin Cities and Minnesota Natural Heritage published by the University of Minnesota Press.

Organization: Three Rivers Park District

Organization Description:

Three Rivers Park District is a natural resource-based park system in the west suburban Minneapolis/St. Paul metro area of Minnesota. We manage almost 27,000 acres of park reserves, regional parks, regional trails, and special-use facilities. The name "Three Rivers" comes from our parks' geography, situated within the watersheds that flow into three significant rivers to this region: the Mississippi, the Minnesota and the Crow. Minnesota State Legislature established Three Rivers Park District as an independent, special park district in 1957. Our charge is to acquire, develop and maintain large park reserves and regional parks and trails for the citizens of suburban Hennepin County, the metro area and the State. The District has been restoring and managing its natural resources for over 50 years. This includes 2000 acres of prairies. The district has also be involved in a number of animal introductions including Trumpeter Swans, Osprey, Bullsnares and Regal Fritillary butterflies.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
U of MN - PI		Oversee lupine assessment and KBB monitoring			0%	0.3		\$51,000
U of MN Lead Field Researcher		Conduct field monitoring, research and analysis. Lead lab analyses of plants			0%	3		\$133,000
U of MN 2 field techs		Assist in data collection and monitoring			0%	1.2		\$25,000
							Sub Total	\$209,000
Contracts and Services								
TBD - competitive bird	Professional or Technical Service Contract	Forestry Thinning including tree girdling, mowing, overseeding for 50 acres				0		\$125,000
TBD	Professional or Technical Service Contract	Provide and install 100 bur oak trees with a 3" to 4" caliper by tree spade into designated areas within the project area				-		\$50,000
TBD -	Professional or Technical Service Contract	Measurements of plant nutrition (N, C, K, P)				-		\$6,000
							Sub Total	\$181,000
Equipment, Tools, and Supplies								
	Equipment	Screen cages (20) and Screen Tents (4) and associated materials	For the transportation and release of the KBB from Fort McCoy to Crow-Hassan					\$1,200
	Tools and Supplies	Shade cloth and framing for up to 8 shade structures	The build shade covers of different densities to observe caterpillars use of lupine					\$800
	Equipment	Field Supplies - i-buttons for temperature/humidity measures (\$195 each), shade cloth/stakes for plant manipulations, bags for sample collection, etc.	Measure plant nutrition, temperature and humidity across microsites					\$9,000

							Sub Total	\$11,000
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Fleet vehicle plus mileage per field season, 65 mile round trip to/from campus	Travel to field site from U of MN					\$11,000
							Sub Total	\$11,000
Travel Outside Minnesota								
	Miles/ Meals/ Lodging	2 Trips, no mileage - TRPD vehicles, 10 people for 2 days per trip	This is for the capture crew to travel to Fort McCoy to collect KBB					\$4,000
							Sub Total	\$4,000
Printing and Publication								
	Publication	Journal Page Charges (open access), two papers	publishing results					\$6,000
							Sub Total	\$6,000
Other Expenses								
							Sub Total	-
							Grand Total	\$422,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
In-Kind	TRPD operational funds	Cover the salaries of TRPD staff and vehicle use associated with the grant	Secured	-
			Non State Sub Total	-
			Funds Total	-

Attachments

Required Attachments

Visual Component

File: [fa9045ed-0f7.pdf](#)

Alternate Text for Visual Component

Map of Crow-Hassan showing the release area and the habitat enhancement project areas...

Board Resolution or Letter

Title	File
Three Rivers signed resolution	4ba1c631-1c9.pdf

Optional Attachments

Support Letter or Other

Title	File
Snell-Rood UMN manager and organizer	441fd091-dbe.docx

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Does your project have potential for royalties, copyrights, patents, or sale of products and assets?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

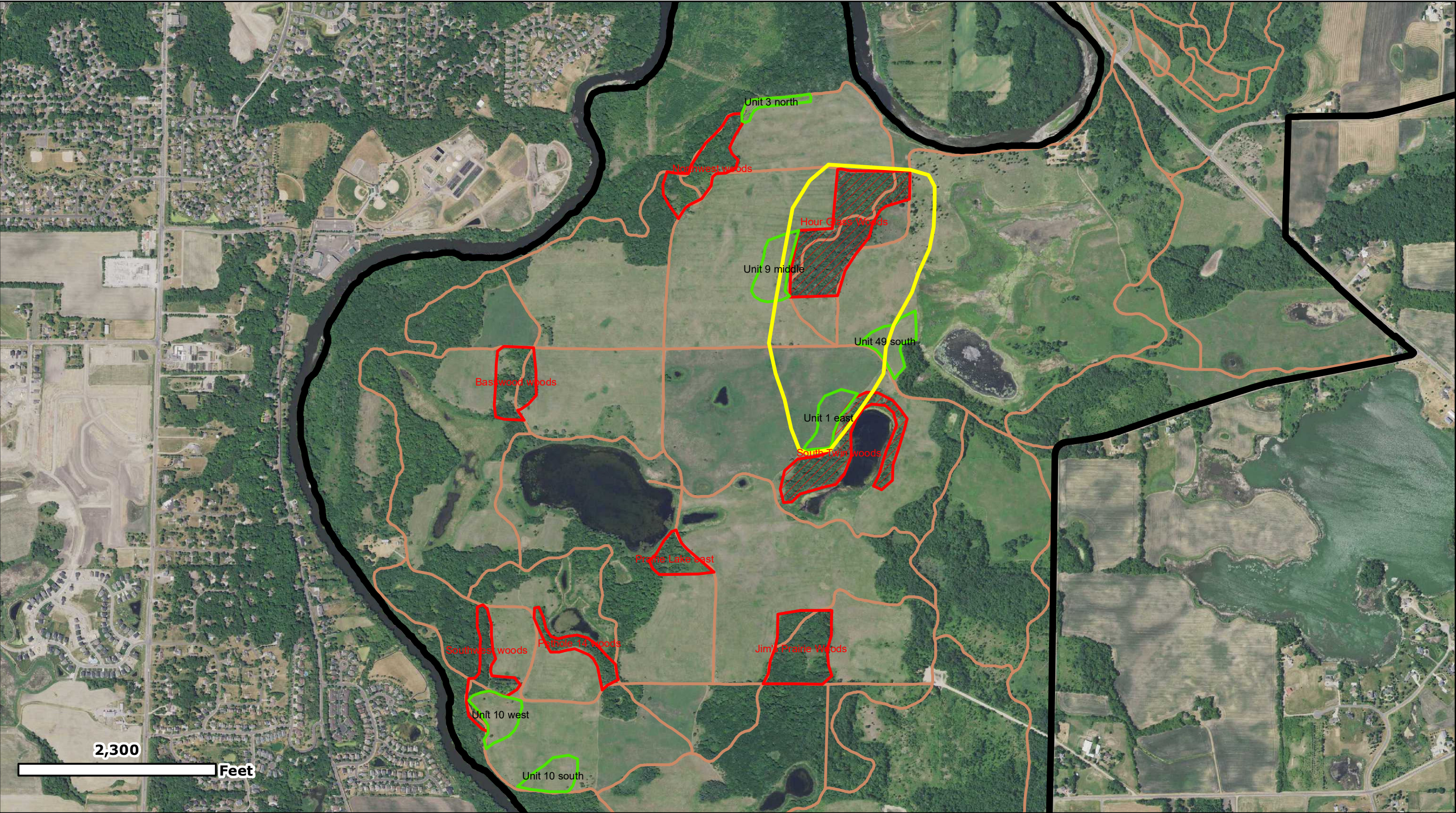
N/A

Does your project include original, hypothesis-driven research?

Yes

Does the organization have a fiscal agent for this project?

No



2,300 Feet

Crow-Hassan Karner Blue Habitat Work and Release Zone

- KBB Initial Release zone
- Oak Planting - Planned
- Oak Planting - in progress
- Woodland Enhancement - Planned
- Woodland Enhancement - in progress
- Trail



This map is for general reference only.
This is not a legal document and it is provided without warranty.
Data represented in this map is from a variety of sources, and is dynamic.
The user acknowledges and accepts these terms.

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Wildlife Section - NRM
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